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ARTICLE

Demobilised troops and approved schools: The aftermath of the First World War as a catalyst for change in British pharmaceutical education

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Abstract

The impact of the First World War on a wide range of professions has been well documented. The upheaval of the workforce and the return of demobilised men led to an unprecedented and seismic reconsideration of entry requirements, educational needs, capacity and priorities at a national level. This article explores the situation for pharmacy, and particularly the national post-war educational context, through local case studies of new schools of pharmacy in Cardiff, Swansea and Portsmouth. In Cardiff and Portsmouth pharmacy education centenaries have been celebrated in 2019, whilst Swansea University will launch a new pharmacy degree programme in 2020, some 101 years after an earlier incarnation was established.

Introduction

> The economic structure upon which our work, our habits, our customs as a people were based was shattered, and a new order had to be rapidly improvised.[1]
>
> Sir William Glyn-Jones
> Secretary and Registrar of the Pharmaceutical Society of Great Britain

At the end of the First World War, the impact of the significant numbers of returning servicemen acted as a national economic catalyst to technical and vocational education. By January 1920, when conscription in Britain ended, approximately 4 million men had been demobilised, with around 400,000 having no work to return to.[2] In 1919 around 4,000 ex-servicemen applied to the Central Grants Committee for state-aided pharmaceutical training. At that time the capacity of existing schools of pharmacy in Great Britain was about 500 students, and so this demand prompted the Ministry of Labour to ask the Pharmaceutical Society of Great Britain (PSGB) to arrange for and to approve additional schools to train them.[3]

An article in *The Chemist and Druggist* on 12 April 1919 outlined the scheme for 'Training Demobilised Men'. It explained that the government were going to consider the men returning from service in three separate classes: 1) those who had sufficient experience, but needed to pass the Qualifying examination of the PSGB; 2) those who still needed to complete an already-started apprenticeship or gain additional practical experience; and 3) those who had no previous experience or qualification 'but who are properly advised to take up the calling'. Demobilised men were strongly advised to take up the full nine month course leading to the Qualifying examination, the piece describing the option of taking a shorter or intensive course as 'a false economy of his own time and of the government money' if he failed the examination for lack of study.[4]

However, the importance of colleges offering part-time options was stressed: some men who had achieved sufficient experience before they enlisted would be best placed to go back to work and study part-time for qualification, and those who needed to undertake practical experience could attend courses during their apprenticeship.[5] The emphasis was on achieving the required standards and not cutting corners, but also on getting men back into work as quickly and efficiently as possible. Following negotiations between the government and William Glyn-Jones representing the profession, demobilised pharmacy students were entitled to the Government Training Grant, covering college fees, examination fees and maintenance costs for the full nine month course, at a total cost to taxpayers of about £400,000. The Society organised the selection process, allocating successful candidates to suitable courses.[6]

A condition of the Government grants allocated to ex-servicemen was that they had to attend a course at an 'approved' institution. However, for pharmacy, this was not something already in place. The PSGB Council saw an opportunity to put into operation the powers given to them by the Poisons and Pharmacy Act of 1908 to require attendance at a course of instruction as a condition of entry for their Qualifying examination, and therefore to codify the educational standard with courses derived from a compulsory national curriculum. Ernest Saville Peck was given the role of visiting universities and technical colleges to 'approve' them as having facilities and staffing sufficient to take on this influx of new students. In just three months, he arranged courses covering both Part I and Part II of the Qualifying examination in 25 institutions, and an even larger number to teach Part I only.[7]

The courses

The Qualifying examination was newly-established in 1918, re-worked from the PSGB's existing Minor examination. By 1920 it was split into two Parts: Part I consisted of pure science (chemistry, physics and bota-

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ny); Part II was an applied pharmaceutical section (materia medica, pharmacy including posology (study of dosages), the translation and dispensing of prescriptions, and poisons laws). The two Parts of the examination could be taken together or separately.

To accommodate the post-war boom in students, an unlimited number of schools were allowed to teach Part I in order to facilitate these numbers and to allow students to study close to home, but the number allowed to teach Part II was restricted to allow a level of control over the purely pharmaceutical elements, and so that – once the boom in demobilised students had passed – there was not a surplus of pharmacy school places. As a piece in *The Chemist and Druggist* stressed, the demand was 'a temporary one owing to the large number of ex-Service men who are taking the Qualifying examination before returning to the pharmacy or dispensary'.[8]

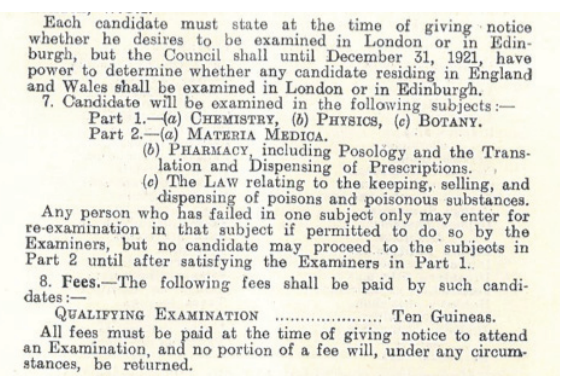
The new, applied pharmaceutical section in Part II, including dispensing of prescriptions and supply of scheduled poisons, was particularly prompted by the need to produce pharmacists to fulfil the duties of the 1911 National Insurance (N.I.) Act, whose impact was only fully felt after the First World War. Its implementation in July 1912 meant that free medical treatment was supplied to all insured people. This had a significant impact for retail pharmacists who were part of the 'panels' that were authorised to provide N.I. prescriptions. Before 1913, 90 per cent of dispensing took place in doctors' surgeries, and one provincial pharmacy reported dispensing only 43 prescriptions in nine years. Now, pharmacists were a key part of a system that marked the first step towards today's welfare state in Britain.[9]

A Regulations and Syllabus document produced as a pamphlet and also published in *The Pharmaceutical Journal* on 2 August 1919 provides full details of the course. The eligibility regulations were stringent: before starting the course, students must have already passed examinations in English, maths (arithmetic, algebra and geometry) and two other optional subjects set by a specified shortlist of acceptable examination boards which included the Central Welsh Board (Junior Certificate), Oxford Junior, Cambridge Junior, London Matriculation or Welsh Matriculation.

A prospective student then had to apply for registration to the PSGB and spend not less than two years (or 4,000 hours) in a pharmacy controlled by a 'duly qualified pharmacist'. The national guidelines laid down that this could be either wholly in retail, or half and half in retail and a hospital setting. Following this, they must spend at least 300 hours studying chemistry, 60 hours of botany and 60 hours of physics at an institution approved by PSGB before being entered for the Part I examination.

As part of the recent re-launch of the courses, the PSGB Council had newly devised these preliminary scientific syllabuses to bring them in line with first year courses at university level so that the pharmacy students could be hosted by existing science departments. If students chose to continue to take the Part II examination, they must first attend a course of study of 720 hours in pharmacy and materia medica at an approved institution, and must also be at least 21 years old.[10] The recommendation from Cardiff Technical College, given in their 1921-22 prospectus, was that during the two years spent in a pharmacy, a student should take advantage of any local courses in chemistry, botany and physics before proceeding to the full-time course, taking Part I in the first year and Part II in the second year. The prospectus suggested

> This plan of study will enable the student to fully grasp the work laid down in the syllabus instead of attempting to cram the work into the all-too-few hours laid down by the Society. He will thus become a trained Chemist who should easily pass the Qualifying Examinations.[11]



Each candidate must state at the time of giving notice whether he desires to be examined in London or in Edinburgh, but the Council shall until December 31, 1921, have power to determine whether any candidate residing in England and Wales shall be examined in London or in Edinburgh.

7. Candidate will be examined in the following subjects:—
Part 1.—(*a*) CHEMISTRY, (*b*) PHYSICS, (*c*) BOTANY.
Part 2.—(*a*) MATERIA MEDICA.
(*b*) PHARMACY, including Posology and the Translation and Dispensing of Prescriptions.
(*c*) The LAW relating to the keeping, selling, and dispensing of poisons and poisonous substances.

Any person who has failed in one subject only may enter for re-examination in that subject if permitted to do so by the Examiners, but no candidate may proceed to the subjects in Part 2 until after satisfying the Examiners in Part 1.

8. **Fees.**—The following fees shall be paid by such candidates:—
QUALIFYING EXAMINATION ..... Ten Guineas.
All fees must be paid at the time of giving notice to attend an Examination, and no portion of a fee will, under any circumstances, be returned.

Figure 1. *Extract from the new Qualifying Examination Regulations & Syllabus, 1919 (Source: Royal Pharmaceutical Society Museum, UK)*

Of course, full-time attendance for two years was a luxury that many aspiring pharmacists could not afford, and for some returning servicemen it was not necessary. Colleges, such as Cardiff and Portsmouth, also offered part-time courses. In Cardiff these ran on Mondays and Fridays from 2:30pm to 5pm and covered pharmacy, materia medica, practical dispensing and Latin, and were linked to Part II of the PSGB's examination 'arranged for apprentices and junior assistants in order that they may obtain additional practice in dispensing, etc, to that of the Pharmacy and also to thoroughly un-

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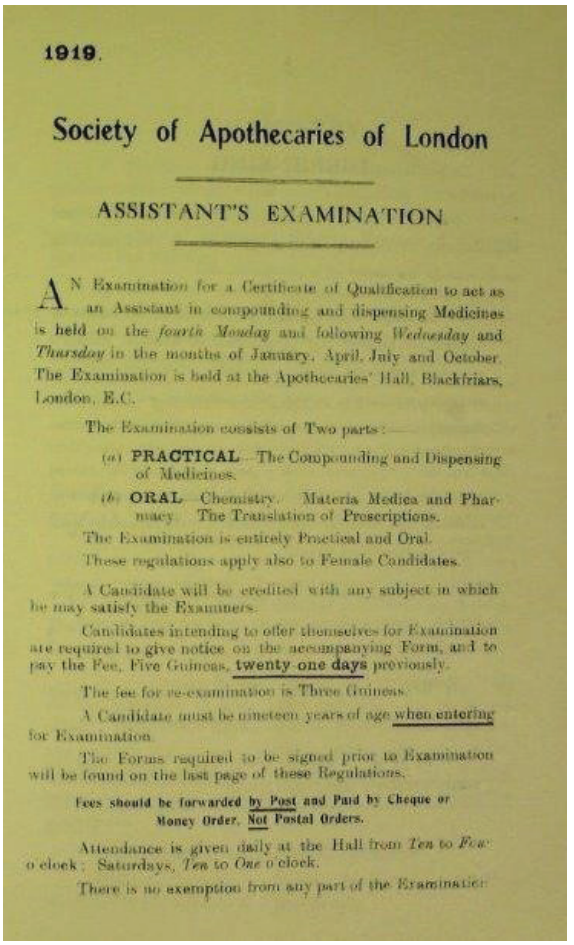
derstand the theory underlying the operations'.[12] Today we might call it a 'day release' scheme.

However, the prospectus is clear that simply attending these two sessions each week alongside an apprenticeship may not be enough: 'At the same time it is necessary to point out to the student that he should take advantage of one or more of the Evening Classes in Chemistry, Botany and Physics in order that he [sic] may more easily understand the principles of the practice of Pharmacy'. The student also had to invest in relevant equipment: 'Students are expected to purchase a box of Dispensing apparatus at a cost of £1 10s 0d, [£1.50] and also to provide themselves with suitable note-books'.[13]

The schools in Cardiff and Portsmouth also offered the Apothecaries' Hall examination. This qualification for assistants or dispensers, which had been established by the Society of Apothecaries after the Apothecaries' Act of 1815, was particularly popular with women students who found that this role was an acceptable one at a time when a female pharmacist, especially working in retail, could be controversial. Women pharmacists in this period still faced significant prejudice from both male and female customers if they worked behind the pharmacy counter, and gaining any kind of business experience was almost impossible.[14]

The Apothecaries' course comprised pharmacy, materia medica and chemistry,[15] and was less academic than the PSGB qualifications, especially for students who did not aspire to own their own business. Interestingly, the 1921-22 Cardiff Technical College prospectus promotes the course purely for female students within a separate section headed 'Women Dispensers'.[16] With other sources such as photographs and speeches indicating that a significant proportion of woman students were enrolling in the main PSGB courses at the school, this gendered section seems out of touch. In fact, at the Cardiff school's official opening, the Lord Mayor noted that he was 'delighted to see that young women had the same opportunities as the men'.[17] Without surviving student records for this early period, it is difficult to know whether there were also any men taking the Apothecaries' examination.

For those not in receipt of a Government grant the fees varied between schools. Fees for the full-time courses were £15 15s (£15.75) in Cardiff and Swansea (worth about £850 in today's money) and £10 10s in Portsmouth. In Cardiff, it was £3 3s (£3.15) for the part-time course (about £170 today) for students from Cardiff and Glamorgan, or 6 guineas (£6.30) for students outside these areas, and £15 15s (£15.75) for the Apothecaries' Hall course. Cardiff Technical College also charged an additional £1 fee for apparatus and a £1 deposit to cover breakages.[18]



1919.

Society of Apothecaries of London

ASSISTANT'S EXAMINATION

AN Examination for a Certificate of Qualification to act as an Assistant in compounding and dispensing Medicines is held on the *fourth Monday* and following *Wednesday* and *Thursday* in the months of January, April, July and October. The Examination is held at the Apothecaries' Hall, Blackfriars, London, E.C.

The Examination consists of Two parts:—

(*a*) **PRACTICAL**. The Compounding and Dispensing of Medicines.

(*b*) **ORAL**. Chemistry. Materia Medica and Pharmacy. The Translation of Prescriptions.

The Examination is entirely Practical and Oral.

These regulations apply also to Female Candidates.

A Candidate will be credited with any subject in which he may satisfy the Examiners.

Candidates intending to offer themselves for Examination are required to give notice on the accompanying Form, and to pay the Fee, Five Guineas, **twenty one days** previously.

The fee for re-examination is Three Guineas.

A Candidate must be nineteen years of age when entering for Examination.

The Forms required to be signed prior to Examination will be found on the last page of these Regulations.

Fees should be forwarded by Post and Paid by Cheque or Money Order. Not Postal Orders.

Attendance is given daily at the Hall from *Ten* to *Four* o'clock; Saturdays, *Ten* to *One* o'clock.

There is no exemption from any part of the Examination

Figure 2. *The Society of Apothecaries Assistant's Examination, 1919 (Source: Society of Apothecaries Archives, UK)*

The schools of pharmacy

The full list of approved schools was given for the first time in August 1920.[19] Thirteen were permitted to teach Part I only, and ranged from Sheffield University and Southampton University College to West Ham Municipal Technical Institute and even Wiggeston Grammar School in Leicester. The 25 approved to teach both Part I and Part II consisted predominantly of universities, university colleges and technical colleges including those in Aberdeen, Birmingham, Brighton, Dundee, Edinburgh, Exeter, Glasgow, Leicester, Manchester, Newcastle, Nottingham and Sunderland.[20] Some were already well-established such as Manchester University, which already offered the Qualifying, Major and Degree routes into Pharmacy. Nevertheless, in the educational listings of *The Chemist and Druggist* in August 1919, it announced 'A new laboratory with thirty-six extra benches will be ready in October'.

Others offered the Qualifying examination course for the first time, including Cardiff, Portsmouth and

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Figure 3. *Portsmouth Municipal College and Town Hall (Source: undated postcard)*

Swansea. In the 1919-20 academic year the PSGB allocated 1,400 students to pharmacy courses, and 1,500 to colleges in 1920-21. This still left more than 1,000 men without a place. Instead the PSGB established 'the homework scheme' where students were provided with three or four books, and they could then sit for the Society's examination in these subjects. Speaking at the opening ceremony for Cardiff's new school of pharmacy on 8 October 1919, the Lord Mayor stated: 'We must do all we can to help the men who found security for us in the time of strife and danger we had just been through'.[21]

Portsmouth

In the August 1919 educational listings in *The Chemist and Druggist*, Portsmouth Municipal College listed a college principal and head of the chemistry department, but a vacancy for the post of lecturer on pharmacy. Nevertheless, it stated

> It is hoped to arrange courses for the Qualifying Examination of the Pharmaceutical Society and for assistants to apothecaries. There will be separate courses for day and evening students.[22]

The roots of formal pharmacy education in Portsmouth go back to the early 1900s and the Portsmouth Municipal Technical Institute, at which part-time classes in pharmacy and dispensing began in 1906, alongside classes in physics, chemistry and botany, promoted as ideal for prospective pharmacy students wanting to pass the PSGB initial Preliminary Examination.

The pharmacy course was led from 1910 to 1914 by Elsie Hooper (later Higgon) (1879-1969), having already achieved success in the PSGB Minor and Major examinations, and graduating with a BSc in botany and chemistry from London University in 1905. She also served as the first Joint Secretary of the (National) Association of Women Pharmacists, and

Figure 4. *Elsie Hooper, c.1905 (Source: Royal Pharmaceutical Society Museum, UK)*

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worked as a researcher for King's College, the *British Medical Journal* and the *British Pharmaceutical Codex* before taking up the post in Portsmouth.[23] Whilst working at the college she attended at least one suffrage march in London.[24]

In June 1919 an advertisement appeared in *The Chemist and Druggist* for a lecturer in the chemistry department who was also expected to teach pharmacy with a starting salary of between £200 and £250 with progression at £25 p.a. to a maximum of £350.[25] Mr F. Hemming was appointed senior lecturer in pharmacy at a salary of £260 p.a., with the Portsmouth Education Committee minutes stating

> Correspondence was submitted showing that the Society [PSGB] desired to know if the Committee could accommodate 25 ex-service students under the Government Scheme of Training, and stating that the Council were prepared to recognise the College as an approved Training Centre.[26]

By August 1920 Portsmouth was offering a full-time course for the Qualifying examination and a part-time one for apothecaries' assistants, alongside separate evening classes.[27]

PORTSMOUTH MUNICIPAL COLLEGE.

Principal: Oliver Freeman, Wh.Sc., A.R.C.S., B.Sc.

Applications are invited for the following appointments at September next:—

CHEMISTRY AND NATURAL SCIENCE DEPARTMENT.

Two Lecturers for Chemistry. In one of the appointments a teaching knowledge of Pharmacy will be a recommendation.

One Lecturer for Pharmacy. A teaching knowledge of Chemistry and Botany will be a recommendation.

One Lecturer in Natural Science.

Salary: £200—£10—£250, then by £25 each four years to maximum of £350

(The commencing salaries in the scale will be fixed according to the candidates' qualifications and experience.)

Application form and further particulars may be obtained by forwarding an addressed foolscap envelope to the Secretary, Offices for Higher Education, Municipal College, Portsmouth, to whom applications should be returned as early as possible, accompanied by copies of not more than three recent testimonials.

H. E. CURTIS,
Secretary.

S. 21/6/19.

Figure 5. *Staff vacancies, Portsmouth Municipal College, 1919 (Source: The Chemist and Druggist, 28 June 1919)*

The pharmacy course was strongly supported by the local pharmacy community, with the offer in April and May 1920 from 'four pharmacists of the town who wished to remain anonymous' of two silver and two bronze medals as competition prizes for students of the pharmacy classes attended by ex-service men. From the first cohort, war veteran Leslie Henry Harlow received the Queensboro medal for pharmacy, materia medica and dispensing from the Portsmouth Municipal College on 16 July 1920.[28]

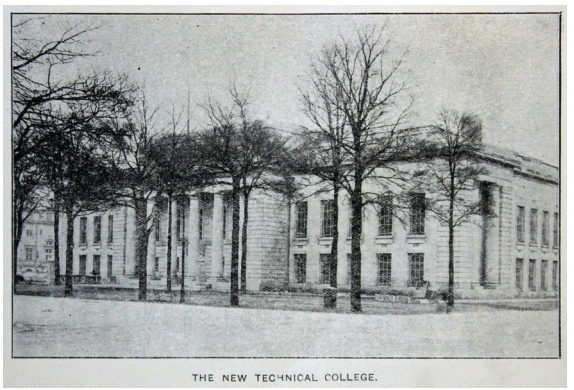

Figure 6. *The New Technical College, Cardiff, from its 1921-2 prospectus (Source: Glamorgan Archives)*

Cardiff

Local support was also key to the establishment of the pharmacy school in Cardiff. On Friday 10 October 1919, *The Times* 'News in Brief' column simply reported 'Cardiff now has a College of Pharmacy'. The following week, *The Pharmaceutical Journal* carried a much more detailed article reporting the official opening of the college by the Right Honourable Lord Mayor of Cardiff, on Wednesday 8 October 1919. Sir William Glyn-Jones, the PSGB's Secretary and Registrar, gave the inaugural address, and the event was chaired by Councillor F.W. Blake, Chairman of the Technical Instruction Committee 'supported by several influential gentlemen'. Also present were members of the Cardiff Chemists' Association, and the South Wales and Monmouthshire Local Associations Federation described as 'largely instrumental in bringing this great project to a successful beginning'.[29]

This was certainly true. Reports from the pharmacy press show that excitement had been building about the college's opening amongst gatherings of Welsh pharmacists. In February 1919 the Carmarthenshire Chemists' Association held 'interesting discussions' about the new pharmacy school 'for Wales' in Cardiff.[30] In March, pharmacist Alfred Hagon gave a 'chatty and entertaining lecture' to the Cardiff Rotary Club including information about the scheme to open the school of pharmacy in September.[31] Later accounts ascribe the original idea for a pharmacy school in Cardiff to Mr Hagon.[32]

The South Wales Federation elected an advisory committee to work with PSGB Council member Major Ernest Saville Peck to establish 'a course of action in reference to the instituting of the National College of Pharmacy for Wales'. The committee's membership reflected the commitment to make it more than a school for Cardiff with representatives from Carmarthen,

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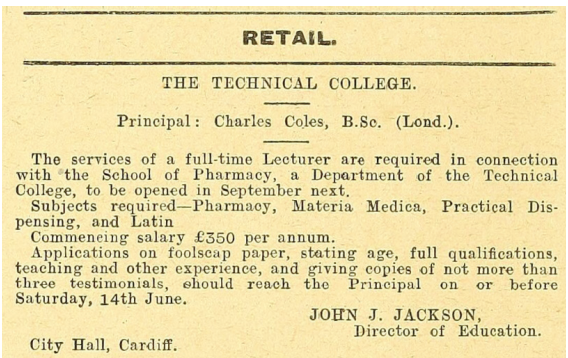
Pembrokeshire, Merthyr, Swansea and Rhondda as well as pharmacists from Barry, Mid-Glamorgan and Cardiff itself.[33]



RETAIL.

THE TECHNICAL COLLEGE.

Principal: Charles Coles, B.Sc. (Lond.).

The services of a full-time Lecturer are required in connection with the School of Pharmacy, a Department of the Technical College, to be opened in September next.
Subjects required—Pharmacy, Materia Medica, Practical Dispensing, and Latin
Commencing salary £350 per annum.
Applications on foolscap paper, stating age, full qualifications, teaching and other experience, and giving copies of not more than three testimonials, should reach the Principal on or before Saturday, 14th June.

JOHN J. JACKSON,
Director of Education.

City Hall, Cardiff.

Figure 7. *Lecturer vacancy, The Technical College, Cardiff, 1919 (Source: The Chemist and Druggist, 31 May 1919)*

By May 1919 a pharmacists' committee had met with the Cardiff Technical Committee, and an advertisement for a 'full-time lecturer' post appeared in *The Chemist and Druggist* on 31 May 1919 and again on 7 June. On 12 July it was reported

> Mr Thomas Lewis, PhC, FSMC, manager with Boots Ltd at Wine Street, Bristol, has been appointed Lecturer in Pharmacy in the new department at the Cardiff School of Technology.[34]

Although it was not stated in these terms, Lewis's position was that of head of school. In the same edition of *The Chemist and Druggist* there was an advertisement for a second lecturer, at a salary £50 less than Mr Lewis's role. With plans to staff the new department in place, the advisory committee 'were instructed' to organise the opening day in October.[35] At the school's opening, aspirations were justifiably high. It was reported that Councillor Blake stressed that '

> No effort on his Committee's part would be lacking to make this School of Pharmacy rank highest in the country. It rested also with the students themselves. They were not catering for Cardiff alone, but for the whole of Wales. The lecturers obtained were of the best, and appointed by his Committee in consultation with chemists themselves. There was every possibility of the School being a great success.[36]

Sir William Glyn-Jones raised the stakes even higher, telling the students:

> It was their privilege to be educated at the Welsh College of Pharmacy, and they were the first students who would set the traditions of the College so high, he hoped, that in after years to be able to say that one was educated at the Welsh College of Pharmacy would do much to secure a berth in advance of others not so fortunate.[37]

The first year intake appear to have met the required standard with reports in late July 1920 of examination passes for Cardiff-based students including W.C. Nicholas for the Qualifying Examination, and J.M. Davies and W.V. Niblett for Parts I and II examinations.[38]

Figure 8. *The first cohort of students and staff in Cardiff, 1920 (Source: School of Pharmacy and Pharmaceutical Sciences, Cardiff University, UK. Published in The Chemist and Druggist, 21 August 1920)*

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The pharmacy students were taught by both dedicated staff and those from other Technical College departments. Joining Mr Lewis as his assistant and lecturer in pharmacy, materia medica and Latin, was Mr F.C. Highfield. Mr Rudge, BSc, was also listed in the first year as lecturer in botany and chemistry, and Thomas Jones as lecturer in physics. By August 1920, Mr H. Aldred, MSc, had joined Mr Rudge in physics, and Miss Margaret L. Andrews, MSc, had joined Mr Jones in botany. The school was clearly meeting a need, as the piece ended: 'All the benches for the next session, which will commence on October 5, have been allotted'.[39]

At the start of the 1920-21 academic year Charles Coles, Principal of the Technical College, gave an overview of the School's activities for the previous year, giving 'great praise to Messrs Lewis and Highfield'. He started with a breakdown of student numbers: 63 full-time students, including 53 ex-servicemen, were working for the Minor examination; 12 full-time students on the Apothecaries' Hall examination course; and 13 part-time attending 3 afternoons each week. The total of 88 students represented maximum capacity for the college. Looking ahead to the following academic year, there were 51 full-time students on the Minor course, including 41 ex-servicemen, 12 Apothecaries' Hall students, and 10 part-time students. In the first year, 21 students had passed Parts I and II of the PSGB Qualifying examination and were now pharmacists. Sixteen had passed Part I.[40]

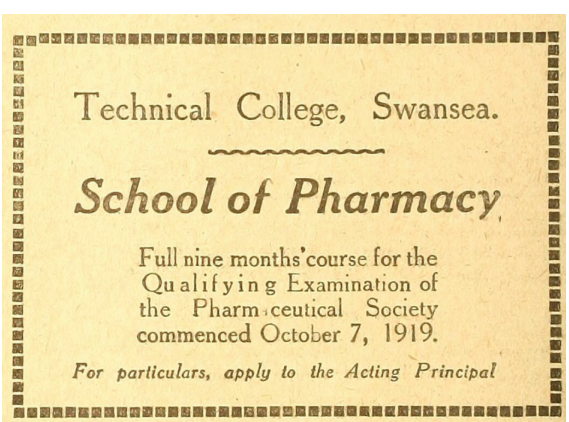

Figure 9. *Course advertisement, The Technical College Swansea, 1919 (Source: The Chemist and Druggist, 11 October 1919)*

Swansea

For nearly a decade, there were two schools of pharmacy in South Wales. On 17 May 1918 *The Cambria Daily Leader* reported

> Dr Arbour Stephens, of Swansea, is endeavouring to get a pharmacy department established in connection with the Swansea Training College. The idea is to train ladies to act as dispensers.[41]

Although Swansea was definitely on the pharmacy map, having hosted the British Pharmaceutical Conference in 1880, its progress towards a pharmacy school was no swifter than in Cardiff. Again, the catalyst was obvious:

> It is a remarkable fact that the majority of applications for appointments and student courses from ex-service officers relate to pharmacy and there has been a spec[ial?] glut of these applications at Swansea.[42]

By August 1919 *The Chemist and Druggist* included the Swansea school in its annual educational listings, with staff listed from the chemistry, physics and botany departments as well as Mr W.T. Siverstsen, chemist and druggist, as the member of staff for pharmacy.[43] However, the advertisement for a lecturer at the school to teach the PSGB Minor examination syllabus (£350 p.a.) suggests that arrangements were not yet in place to welcome the students.

Nevertheless, the school opened on 7 October 1919 at the Municipal Technical College, Mount Pleasant, Swansea. Mr S.A.W. Rushbrooke, PhC, is listed in contemporary reports as lecturer in pharmaceutics, with Mr E.A. Tyler as head of chemistry.[44] Like its Cardiff and Portsmouth equivalents, the school received significant support from the local pharmacy community. The Swansea and West Glamorgan Chemists' Association presented a silver and bronze medal each year to high-performing pharmacy students.[45] In 1921 the school is styled the 'West Wales College of Pharmacy' in *The Pharmaceutical Journal*.[46]

The existence of two pharmacy schools in South Wales prompted almost immediate debate, initiated by the advisory committee of the Welsh College of Pharmacy in Cardiff. They passed a formal resolution in October 1921 'that the Pharmaceutical Federation be asked to consider the question of the advisability of continuing two Schools of Pharmacy in Wales'. At the South Wales and Monmouthshire Local Pharmacy Association Meeting in Neath on 9 February 1922, this resolution 'caused a very animated discussion…' However, the pragmatic decision was made not to take any hasty action, as the question would arise again – once the glut of ex-service students were trained – as to whether the Swansea and Cardiff schools would both be able to carry on, and then it would be for the local authorities to decide.[47] By 1923 the intake of ex-servicemen was over, and the schools entered a new phase.

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The following decades

During the 1920s all three schools appeared to go from strength to strength. In Portsmouth in 1922, a course for the Pharmaceutical Chemist (PhC) Diploma was organised. In 1925 the Cardiff School ran this same PSGB Major course for the first time, and Swansea introduced it in 1926. Both the Portsmouth and Cardiff schools received recognition from the University of London to teach that university's external Bachelor of Pharmacy degree in 1927.

However, in June 1929 Swansea's head of school, Harold Davis, was appointed chief pharmacist to University College Hospital, London (he went on later to become chief pharmacist at the Ministry of Health). On Mr Davis's departure Mr Andrew James Thorburn, PhC, had been appointed head of pharmacy. However, at a meeting of the Swansea Higher Education Committee on 2 December 1929 it was reported that the director of education had received a letter from the PSGB secretary questioning Mr Thorburn's salary in the light of the recent Burnham Report.[48]

The Society stated that the head of school should be paid no less than £500 p.a., and that the school would not be recognised officially for its Qualifying examination unless this was complied with. Swansea Education Committee responded that no other society sought to prescribe terms for its members, and suggested that such action would mean that colleges would be reluctant to develop professional courses. The Committee also reminded PSGB that the maintenance of the pharmacy department was an advantage to PSGB as well as to the general public.[49]

There seemed to be no mood for reconciliation, and a letter from the PSGB dated 7 December 1929 announced the withdrawal of the Society's recognition of the College as an institution to take the Qualifying examination after 31 July 1930.[50] It was reported in *The Pharmaceutical Journal* on 13 September 1930 that a last ditch effort to maintain the department had been unsuccessful. An 'agitation' by the Labour section of Swansea Council led to the agreement that the salary would be set at the £500 demanded by PSGB. However, the article concluded

> The letter now received from the Society [PSGB] regrets that Swansea's decision has come too late for the Society to alter its refusal to recognise the Swansea College.[51]

So, whilst in October 2019 the pharmacy schools in Cardiff and Portsmouth are celebrating 100 years of pharmacy education in their cities, in Swansea – ninety years after the last pharmacy students qualified – a new pharmacy department is being established as part of Swansea University.[52]

Conclusion

In 1919 a combination of factors combined to create a step-change in British pharmacy education. These were, firstly, the national imperative created by significant numbers of demobilised men keen to grasp the opportunity of government funding for professional training. Secondly, the chance seized by the Pharmaceutical Society of Great Britain to use the new circumstances to implement the long overdue national codification and control of pharmacy educational facilities and curricula, which had been promised by the 1908 Pharmacy Act. Thirdly, the changes were given greater impetus and were augmented by the impact on retail pharmacy of the delayed comprehensive implementation of the National Health Insurance scheme. Fourthly, the availability and willingness of existing institutions to deliver pharmacy courses. And fifthly, the enthusiastic support available from the local pharmacy communities, who were keen to see their profession prosper and develop.

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ARTICLE

An historical and chemical study of *Samona* brand tablets: A tonic available in the United Kingdom from the late 1930s

Andrew Hardy and Gavyn Rollinson

Abstract

Two medicinal tonics, *Samona* brand tablets No. 1 (for men) and *Samona* brand tablets No. 2 (for women), were available in the United Kingdom from the late 1930s. This article presents historical and some initial chemical data on these tablets. They were initially well advertised, mostly in the weekly trade magazine, *The Chemist and Druggist*. Some reasonably detailed compositional data was given on their containers. Our historical data, and to a lesser extent our chemical data, indicate that these tablets contained various crushed and dried whole glands (or glandular extracts) and so were perhaps intended as 'aphrodisiac/rejuvenation tonics', in addition to their use as a general tonic.

Introduction

In the first half of the twentieth century in the United Kingdom there were a multitude of tonics available to the paying public. They could be mildly restorative energy drinks containing sugar or small amounts of alcohol; or stronger ones containing caffeine, larger amounts of alcohol or a variety of herbal extracts; or a few that contained potentially toxic/addictive substances such as amphetamines and opiates.

When tonics were sold as 'popular medicines', they were often described at this time in the United Kingdom as nostrums, patent medicines or proprietary medicines. There were also the so-called 'quack' medicines, which were made and sold by so-called 'quack doctors'– who were usually regarded as charlatans or mountebanks by the medical profession.[1]

Nostrums were medicines made up from a book of recipes belonging to a community apothecary, chemist and druggist or pharmacist. A patent medicine was one whose details of manufacture and composition had been protected in law by obtaining 'letters of patent' from the government for a fee. However, this veneer of associated respectability was often undermined by minimal or meaningless information being given, and by the reluctance of the authorities to strictly enforce the law.

Thus many patent medicines were often regarded as 'quack' medicines. A proprietary medicine was one sold under a brand name, which was often trademarked. Sometimes they were also patented (or claimed to be). They could be purchased freely as over-the-counter medicines, and were sometimes prescribed by a registered medical doctor. Overall this gave rise to 'secret remedies', whose composition was effectively unknown; and to 'non-secret remedies', where compositional data *was* given on the medicine's container or associated leaflet.[2, 3]

By the first decade of the twentieth century the British Medical Association (BMA) had become concerned over the public's increasing use of 'popular medicines'. They therefore decided to have some of them chemically analysed and the results published. Overall, several hundred such medicines were analysed, and in 1909 a book containing some of the results was published *(Secret Remedies: what they cost and what they contain*). More analytical results were published in a second book published in 1912: *More Secret Remedies: what they cost and what they contain.* This second book includes a chapter entitled 'Nerve Tonics and Elixirs of Life'.[4] Two examples of tonics mentioned in this chapter are given below:

1. *Guy's Tonic* was a red liquid prepared and sold by a London firm. Its associated leaflet said it could be used for a whole range of ailments, which included as a tonic. It was found to contain: small amounts of cochineal colouring, hydrochloric and phosphoric acids and alcohol; and significantly larger amounts of chloroform water and compound infusion of gentian (an infusion of the bitter extract of gentian root).
2. *Damaroids* were pills, again prepared and sold by a London firm, but having a somewhat less effusive list of ailments that they could cure. The pills were sugar-coated and otherwise consisted of (in increasing % presence) quinine sulphate, iron hypophosphite, talc and an 'extract' (thought probably to be Damiana – the leaf extract of the shrub *Turnera diffusa*).

Though thousands of these books were sold, such medicines continued to be used, and they were often heavily advertised. A brief survey by us of the weekly trade magazine *The Chemist and Druggist* (C&D) from the late 1930s to the early-to-middle 1940s gives many proprietary medicine advertisements.[5] Some were for various types of tonics, and a few examples are as follows:

1. The glucose-containing carbonated energy drink *Lucozade*.
2. Liquid and pills of '*Phosferine*: A tonic restorative after winter ailments'. The liquid was analysed and the results given in the above mentioned 1912 book.

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Its composition was given as – in increasing parts by measure – quinine sulphate, diluted sulphuric acid, alcohol and diluted phosphoric acid.[6]

3. The 'reconstructive tonic' syrup *Minadex*. It was said to contain vitamins A and D, plus iron, calcium and other essential tonic minerals.
4. *Manoids,* which were described as 'the potent brain and nerve tonic for men'. This advertisement is much smaller than for the three above, and only gives the above statement about itself, plus its price and an address in Surrey.

Mention should also be briefly made of 'aphrodisiac tonics'. Such tonics at this time sometimes contained crushed and dried whole glands and/or glandular extracts (both usually bovine). Their perceived active ingredients were usually the various hormones produced by specific glands. These hormones, often the male/female sex hormones, were being isolated with increasing purity at this time. They were sometimes listed as a tonic's component or as separate materials to be administered directly.

An example of a *Chemist and Druggist* advertisement from 1943 for purchasing the sex hormones themselves is for the 'Sublingual Administration of the Sex Hormones…' in the form of *Linguets* (this last word being said to be trademarked). Three types of pills were listed, where each were said to contain a different, orally active hormone derivative.[7] No uses were given in the advertisement, but two previously published medical papers were mentioned. These papers give information on the positive results obtained when two of the advertised hormone derivatives were clinically tested.[8, 9]

The origins of *Samona* brand tablets

The Company known as 'Samona Ltd' was set up in London in April 1938 by a Mr James Dunn (1879-1960). On the company records[10] he is listed as company director and 'chemist', with a residential address in Newton-Stewart, Dumfries, Scotland. The company's initial address was given – in its advertisements and on our bottle's label for the No. 1 (for men) tablets (Figure 1) – as 16 (sometimes 16-18) Charterhouse Street, London, E.C.1. The address given in the advertisements changed to Northington House, Northington Street, London, W.C.1, from October 1941. This address was on our bottle's label for the No. 2 (for women) tablets; implying that our 'No. 1' samples were made and marketed first (i.e. between spring 1938 and autumn 1941) and that our 'No. 2' samples came later (i.e. from autumn 1941 onwards).

Mr James Dunn was a registered chemist and druggist, and was first registered as such with the Pharmaceutical Society of Great Britain in April 1901. He was a community pharmacist with a shop in Newton-Stewart, Dumfries (where its exact address was the same as that given in the above Company's records), from which he retired in 1947. He had resigned from Samona Ltd in February 1943. The Company changed ownership and location several times over the following decades, as did the stated recipe for the *Samona* brand tablets (see below). The Company was finally dissolved in 1982.

The first advertisement for these tablets appeared in the trade magazine *The Chemist and Druggist* was in the issue of 7 May 1938. The first mention of the existence of separate tablets for men and women in the advertisements was in the issue of 18 June 1938. This information was retained in the advertisements until the end of June 1940. The tablets were heavily advertised in *The Chemist and Druggist* initially, and *Samona* brand tablets were one of its top twenty most advertised products of 1938.

In all the advertisements there is given – in varying amounts of detail – a list of ailments that the tablets 'cured'. For example, in *The Chemist and Druggist* issue of 6 April 1940, it is stated that a *Samona* brand tablet '…brings immediate relief in all cases of nerve strain, depression, sleeplessness, tired and listless appearance, mental and physical exhaustion'. The number of advertisements slowly decreased into the early to middle of the 1940s, and by 1948 they were being much less advertised.

Recipes for *Samona* brand tablets were first listed in Martindale's *Extra Pharmacopoeia* in volume II of the twenty-second edition published in 1943.[11] The recipe given for the 'No. 2 (for women)' tablets was identical to that found on the label of our bottle (see later, Table 4). The recipe for 'No. 1 (for men)' tablets was different, and is given in Table 1, along with the amounts per tablet and an interpretation for each ingredient. Note that a grain (gr.) is 64.8 mg and a minim (min.) is 0.0591 ml. We have been unable to determine the meaning/amount of a 'unit' as described here. Both recipes had a daily dosage of one tablet listed.

The two recipes were next mentioned in volume II of the twenty-third edition of Martindale's *Extra Pharmacopoeia* published in 1955.[12] However, these tablets were listed as being manufactured by the Camden Chemical Co. of 61 Gray's Inn Road, London, W.C.1. The recipe for 'No. 1 (for men)' is given in Table 2, again with the amount per tablet and with an interpretation of each ingredient.

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Table 1. *Contents of Samona brand tablets No. 1 (for men) in 1943 (Source: Martindale)*

Ingredient	Quantity	Explanation
Bitestin Standard	2 units	Probably testis material or extract
Vitamin E conc.	1/10 of a minim	Concentrated source of vitamin E, such as wheatgerm oil
Corp. Glandulae Compos.	5/6 of a grain	Probably a mixture of glands
Pulv. Cinch. Rub.	1/3 of a grain	Powdered red cinchona bark
Tr. Iode. Fr. Cod.	1/30 of a minim	Tincture of iodine, as described in the Official French Codex, i.e. the *French Pharmacopoeia*
Excipient	q.s.	'Quantum sufficit', that is 'as much as sufficient'

Table 2. *Contents of Samona brand tablets No. 1 (for men) in 1955 (Source: Martindale)*

Ingredient	Quantity	Explanation
Strychnine	0.002 grain	An alkaloid
Iodine	0.175 grain	
Potassium iodide	0.068 grain	
Soft extract of kola	1.000 grain	From the dried cotyledons (seed leaves) of *Cola nitida* and *C. acuminata*, where the active ingredient is caffeine
Glycyrrh. Pulv.	1.000 grain	Powdered liquorice root
Vitamin B1	0.003 grain	
Vitamin A	100 i.u.	
Vitamin D2	10 i.u.	

The recipe given for 'No. 2 (for women)' is as listed in Table 2, with an additional ingredient of 50 i.u. of stilboestrol (a synthetic female sex hormone). An international unit (i.u.) is a small unit of weight or volume, which varies according to the biologically active substance being discussed.[13]

Whilst these two (1955) recipes contain two known stimulants (caffeine and strychnine), they do not contain any whole glands or glandular extracts. One contains a small amount of a synthetic female sex hormone. Given the above, and that they were not made or marketed by Samona Ltd, we will not discuss them further. There is no mention of *Samona* brand tablets in the twenty-fourth (1958/61, volumes I and II), twenty-fifth (1967), twenty-sixth (1972) or twenty-seventh (1977) editions of the *Extra Pharmacopoeia*. No further editions were examined as Samona Ltd had been dissolved in 1982.

Figure 1. *SAMONA Brand Tablets No. 1 (for Men), bottle and tablets (Source: Author-see acknowledgements)*

Samples and chemical analytical methods

Sample 1: Samona brand tablets No. 1 (for men)

These tablets are red-brown in colour and each weigh 0.25 gm. They are circular with a diameter of 8 mm and a uniform thickness of 2 mm. Using the weight of

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our tablet and the ingredients' percentages given in Table 3 we have added in a separate column the amount of each non-excipient ingredient (in grams, gm) in one tablet. The tablets are in their original screw-top glass bottle, with labelling on its front and back (Figure 1).

On the back label is given the dosage (one tablet three times a day, preferably before meals), the manufacturer's company name and address (Samona Ltd, 16/16-18 Charterhouse Street, London, E.C.1), and the words 'No proprietary right is claimed apart from the registered trade mark *Samona*'. Also, at the top of this label are the words 'Samona Brand Tablets No. 1 (for Men)'. On the front label are the words 'Makes Life Anew', and in finer print some abbreviated compositional details are given. These are reproduced in Table 3, along with an interpretation of each ingredient.

Sample 2: Samona brand tablets No. 2 (for women)
These tablets are dark brown in colour and each weigh 0.29 gm. They are circular with a diameter of 9.5 mm. Again we have added, after each ingredient's percentage given in Table 4, the amount in one tablet. The tablets were found in their original screw-top bottle (with labelling front and back), which was in its original box with a leaflet (Figure 2).

On the back label of the bottle is given the same dosage as before and the same words regarding the trade mark name *Samona*, but with a different address (Northington House, Northington Street, London, W.C.1). Also, at the top of this label are the words 'Samona Brand Tablets No. 2 (for Women)'. On the front label are again the words 'Makes Life Anew', and in finer print at the base of this label some abbreviated compositional details are given. These are reproduced in Table 4, along with the interpretation of each ingredient.

Figure 2. *SAMONA Brand Tablets No. 2 (for Women), bottle and tablets, with box and leaflet (Source: Park Pharmacy Trust Collection, Plymouth, UK)*

Table 3. *Contents of Samona brand tablets No. 1 (for men) (Source: Sample 1 label)*

Ingredient	Percentage	Approximate weight in gm	Explanation
Prostatine Sicc.	17.50 %	0.04380 gm	Probably dried prostate gland
Didymin Sicc.	17.50 %	0.04380 gm	Probably dried testes material/extract
Thymus Sicc.	8.75 %	0.02190 gm	Dried thymus gland
P. Cinch. Rub.	35.00 %	0.08750 gm	Powdered red cinchona bark
Tr. Iode. Officin. Fr. Cx.	1.75 %	0.00438 gm	Tincture of iodine, as described in the Official French Codex, i.e. the *French Pharmacopoeia*
P. Glycyrrhizae	17.50 %	0.04380 gm	Powdered liquorice root
Excipient	to 100.00 %	i.e. 2%	

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Table 4. *Contents of Samona brand tablets No. 2 (for women) (Source: Sample 2 label)*

Ingredient	Percentage	Approximate weight in gm	Explanation
P. Cinch. Rub.	35.00 %	0.10150 gm	Powdered red cinchona bark
Tr. Iode. Officin. Fr. Cx.	1.75 %	0.00508 gm	Tincture of iodine, as described in Table 3
Thymus Sicc.	8.75 %	0.02540 gm	Dried thymus gland
P. Glycyrrhizae	17.50 %	0.05080 gm	Powdered liquorice root
Dihydroxyphthalophene	2.75 %	0.00798 gm	Phenolphthalein
Embryonic Subs.	8.75 %	0.02540 gm	Literally, 'embryonic substances', which probably means ovary/embryo gland/mixture of glands/extract)
Trihydroxyoestrin	0.0105 %	0.0000305 gm or 0.0305 mg	Estriol, a female sex hormone
Excipient	to 100 %	i.e. 25.50 %	

Chemical analytical methods used

The chemical analytical techniques used so far on our two samples have been QEMSCAN (Quantitative Scanning Electron Microscopy), XRPD (X-Ray Powder Diffraction) and a preliminary analysis on only one sample – No. 1 (for men) – using MS (Mass Spectrometry). The first technique does elemental analysis (down to and including carbon) and identifies crystalline or amorphous inorganic/mineral compounds (or sometimes a group of compounds) present. The second technique can identify crystalline materials present, and the third technique the organic compounds.[14, 15]

Results

Results for Samona No. 1 (for men) tablets

QEMSCAN: one tablet was cracked open and data collected on both the (powdered) inner and outer materials. Elemental compositions are given in decreasing order of weight percent, and where the elements in brackets are each present at less than 1%.

Inner material: O, C, Ca, Mg, Si, P (Al, F, Fe, K, Cl, Cu)

Outer material: O, C, Ca, Mg (Si, P, F, Al, Cu)

The presence of organic compounds makes quantitative calculations for the inorganic compounds identified uncertain, and so only the most abundant compounds identified are given (in decreasing order of their approximate percentage presence).

Inner material: Dolomite (calcium magnesium carbonate), Magnesium Silicates (such as Talc), Apatite (calcium phosphate), Calcite (calcium carbonate).

Outer material: Magnesium Silicates, Dolomite, Apatite, Calcite.

XRPD: One tablet was completely crushed to powder and the only crystalline material found was the sugar sucrose.

MS: One tablet was crushed to powder and preliminary results showed the presence of two carboxylic (fatty) acids (stearic and palmitic), an unidentified hydrocarbon, sucrose and two other sugar derivatives (perhaps glycosides). Also, the smaller hormone molecules (such as steroids) were searched for, and not found.

Results for Samona No. 2 (for women) tablets

QEMSCAN (as above). Elemental compositions:

Inner material: O, Fe, Si, Mg, C, Ca, Cu (P, F)

Outer material: O, Ca, Fe, Mg, C, Si, Cu (Pb, Zn, S, P, F)

The most abundant compounds identified (as before):

Inner material: Magnesium Silicates, Iron oxide/carbonate, Magnesite (magnesium carbonate), Calcite.

Outer material: Calcite, Magnesite, Magnesium Silicates, Iron oxide/carbonate.

XRPD: One tablet was cracked open and data collected on both the inner and outer materials.

Inner material: Sucrose >> Talc > Calcite.

Outer material: Sucrose >> Calcite ≈ Talc.

It is hoped to use, in the future, the Gas/Liquid Chromatography – Mass Spectrometry (GC/LC-MS) technique(s) to obtain more detailed data on the (non-sucrose) organic components of these two samples, and publish the results in a later article.

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Discussion

As the founding director of Samona Ltd was a registered chemist and druggist and a community pharmacist of long standing in Newton-Stewart, Dumfries in Scotland, we believe that the various recipes given previously for the *Samona* brand tablets should be taken at face value. The listed non-gland ingredients would all have been readily obtainable. Unfortunately, we have no details of how the listed glandular substances ingredients were made or from whom they were obtained. Given the time period (the late 1930s to early 1940s) and the recipe details, we believe that most were whole bovine glands which had been crushed and freeze dried. De-fatting may have taken place, and for any glandular extracts present a degree of solvent extraction may have been done.

Our historical recipe data currently far exceeds our chemical analysis data. The latter will be briefly discussed later, and further work is in progress. We will now discuss the ingredients in the various recipes found for our tablets. A recipe is given on the labels of each of our bottles, where our No. 1 (for men) tablets were marketed and made first (spring 1938 to autumn 1941) and our No. 2 (for women) tablets came later (autumn 1941 onward).

As previously indicated, the recipes are first mentioned in volume II of the twenty-second edition of *Martindale's Extra Pharmacopoeia*, published in 1943. Its recipe for the No. 1 (for men) tablets was different to that found on our bottle, but its recipe for the No. 2 (for women) tablets was identical to that found on our bottle. Thus, overall we have the ingredients of three recipes to consider. Where possible and relevant, we have tried to provide both past (i.e. from the 1920s to the 1940s) and more recent (i.e. from the 1980s to the present) references when discussing the ingredients of our tablets.

Non-gland ingredients

We will first discuss the non-gland ingredients of our three recipes. Overall there are five such ingredients. Red cinchona bark and tincture of iodine are listed in all three recipes. Liquorice root is found in the recipes given on the labels of both our bottles. Phenolphthalein is only found on our bottle label of the No. 2 (for women) tablets, and the concentrated vitamin E is only found in the recipe for the No. 1 (for men) tablets in the 1943 *Extra Pharmacopoeia.*

Cinchona bark, sometimes known as Peruvian or Jesuit bark (the latter reputedly arising from the people who first discovered it in South America and brought it to Europe in the early 1630s) generally comes in three colours; red, yellow and grey-white. Red usually contains the most alkaloids – specifically the biologically-active quinine – and grey-white the least. The bark was powdered and ingested (often in wine) as a prophylactic against and then for the fever if bitten by a malaria-carrying mosquito. It found use as a bitter tonic, and also as an astringent.[16, 17] The compounds found in the bark include several alkaloids and alkaloid-related molecules, a bitter amorphous glucoside (quinovin), starch and calcium oxalate.[18]

Liquorice is the usually peeled root of *Glycyrrhiza glabra*, an herbaceous perennial found in southern Europe and Asia. It has been, and still is, used as a demulcent, sweetener and as a mild expectorant. However, other past medicinal uses are now being re-investigated, including its use for the relief of rheumatic pain and its healing effect on ulcers; and a whole range of potential new bioactive/physiological effects have been suggested. The root has been found to contain many compounds, including fat, starch, various sugars (one of which is sucrose), flavonoids, phenolic compounds and what is considered to be its main biologically-active – and sweet-tasting– compound of glycyrrhizin (a triterpene glycoside).[19, 20] It was, and still is, used to disguise the presence of unpleasant-tasting or bitter ingredients in a medicine, such as the cinchona bark in *Dr Sappington's Fever Pills*.[21]

Tincture of iodine is a solution of iodine dissolved in alcohol, with a concentration range for the iodine of between 2 and 10 per cent.[22] It was used (and still is in such things as emergency medical survival kits), as a water disinfectant and as an antiseptic for external use on wounds. It was also important in the treatment of thyroid gland disease (iodine deficiency leading to goitre).[23, 24]

Phenolphthalein is a man-made mild laxative. It was widely used on adults and children from the beginning of the twentieth century.[25, 26] However, in 1999 it was deemed unsafe by the United States Food and Drug Administration (FDA) and its use was prohibited in the USA.[27]

Vitamin E consists of a small group of structurally-related molecules, where the most biological-active is alpha-tocopherol. The molecules can now be made in the laboratory, but were originally found in various natural food sources (such as wheatgerm, maize and peanut oils). In the early 1940s vitamin E concentrate was available as small capsules of oil concentrate (often wheatgerm). If an adult is deficient in vitamin E then ingesting some concentrate should remove/reduce such symptoms as lack of vitality, muscle weakness and decreased sexual interest. It is an anti-oxidant and is being investigated, and sometimes used, for a variety of ther-

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apeutic uses – such as for burns, scar tissue healing, treatment of skin ulcers and low fertility.[28, 29]

Gland/Glandular Extract/Hormone ingredients

Organotherapy in its broadest sense is the use of an animal part as a medicine for a human ailment. Various past civilisations used animal parts as medicines and the belief of 'like cures like' arose. Examples include: heart preparations for cardiac disease, toad's skin for oedema, testis of donkeys and stags for impotence, and the potion Theriac (originally for viper's bites, but which later became a 'cure-all') contained various exotic animal parts (including crushed vipers).[30]

In the late nineteenth century organotherapy increasingly focussed on the medicinal use of animal glands. These were the whole glands (crushed and dried) or their extracts (where their quality and purity could vary greatly). These extracts – especially from the sex glands – became vastly more well-known (and much more studied) after the extraordinary rejuvenation claims of Charles-Edouard Brown-Sequard in 1889 after his self-medication of 'testicular extracts'. Although much ridiculed, his claims and publications continued until he died in 1894, and they started an avalanche of studies on all manner of extracts.[31, 32, 33]

There were some initial successes in the early 1890s. Thyroid extract, especially when subcutaneously injected, was used to successfully treat myxoedema (1891), and to a lesser extent adrenal extract gave vasopressor effects (1894). However, when pancreatic juices and extracts were tried between 1890 and 1892 for the treatment of diabetes they were unsuccessful.[34, 35, 36] Testing of extracts continued for about another three decades. In the first decade of the twentieth century there was the beginnings of the new medical speciality of endocrinology – the study of ductless glands and their 'internal secretions'. The latter were named hormones (from the Greek 'I arouse or excite') in 1905.[37, 38]

Extracts of sex glands were studied and prescribed for their tonic or rejuvenation effects, in the United States, Great Britain and in Western Europe into the 1920s and beyond. Some positive results were claimed[39, 40, 41] but overall the initial expectations – often wildly optimistic – were not realised. In 1922 the American biochemist Benjamin Harrow made the perceptive statement:

> The achievements [of endocrine science], judged by rigid scientific standards, are no more than modest, but the possibilities are limitless. It is because of these vast possibilities that an imagination, not sufficiently tempered by self-criticism, is apt to enlarge a molehill into a mountain.[42]

Extracts of the thymus and prostate glands

Two other glands should be mentioned concerning their medicinal effects and uses – the thymus and prostate glands. The former is on the labels of both our bottles as part of their recipes, and the latter is only on the label of our 'No. 1 (for men)' bottle.

The function(s) of the thymus gland was unclear for some time. Initially it was thought that its extract could contain a growth-accelerating factor, or that perhaps there was a possible link between it and the development or not of the gonads or uterus. However, from the 1930s such ideas became increasingly suspect. Eventually it was realised that the gland was prominent in cellular immunity, and also involved in the adverse reactions of graft rejection and allergies.[43, 44]

The prostate gland is an ancillary (exocrine) male sex gland associated with the male reproductive system. In the late nineteenth century the prostate was perceived as a 'biological control centre' and to be the 'centre of the male sexual system'. It was thought that prostate problems, such as enlargement and/or inflammation, could lead to nervous conditions such as sexual neurasthenia. Thus, in the first few decades of the twentieth century when glandular substances were increasingly available, a treatment involving medicines was regarded as better than a surgical operation.[45] Prostate gland medicine was sometimes marketed as part of a mixture – such as a mixture of prostate and testis glands and brain tissue (marketed as *Prostatin* and also as *Protestin*, with added yohimbine hydrochloride or yohimbine respectively).[46]

Hormones were being isolated from the start of the twentieth century; but it was time consuming, difficult and often very expensive. By the 1920s it was easier and not so expensive, and eventually they would be made directly in a laboratory by synthetic chemists.[47] The results of using male sex hormones in human clinical studies can best be summarised by three statements from the late 1930s to the late 1940s. A 1939 report found no 'significant aphrodisiacal effect in the normal man'; a 1944 report found that 'normal men experience little, if any, increase in sexual potency or in well-being by taking the male sex hormone'; and a 1949 report stated that for female patients 'testosterone supplementation produced no increase in libido in post-menopausal women with normal testosterone levels'.[48]

The female sex hormone estriol is listed in the recipe on the label of our bottle for the 'No. 2 (for women)' tablets. It was first isolated and reported in 1929/30, was found to be a weak oestrogen, and was suggested initially for a whole range of (female) conditions.[49, 50] It is currently regarded as a potentially safer hormone to use in hormone replacement therapy (HRT) for meno-

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pausal symptoms. However, further safety studies, especially with regard to breast cancer, are regarded as necessary.[51]

Other glandular substances in the tablet recipes

Further consideration will now be given to the interpretations of the various glandular substances given in the recipes for our tablets (excluding the hormone given in one recipe, which has already been mentioned); both on the labels of our two bottles, and in the 1943 *Extra Pharmacopoeia*.

A) 'No. 1 (for men)' tablets: 'Thymus Sicc.' is taken to be dried thymus gland; 'Prostatine Sicc.' is either dried prostate gland or possibly a mixture as mentioned above – prostate and testis glands plus brain tissue; and 'Didymin Sicc.' is dried testicular extract[52] – all from the label on our bottle. The interpretations of the two glandular substances mentioned in the 1943 *Extra Pharmacopoeia* recipe are largely speculation, as no definitive information could be found – 'Bitestin Standard' is assumed to be some sort of standardised testis extract, and 'Corp. Glandulae Compos.' is assumed to be a mixture of glands.

B) 'No. 2 (for women)' tablets: 'Thymus Sicc' is as above, and 'Embryonic Subs.' is assumed to be crushed and dried animal ovary gland – both on the label of our bottle and in the 1943 recipe.

The amount of each ingredient per tablet for our two samples (given previously) can be compared to the relevant dosages given in the 1941 *Extra Pharmacopoeia*. No toxicity would be expected from taking three tablets a day (as recommended), as the total amount of each ingredient ingested would be significantly less than the dosages given in the above Pharmacopoeia.[53] This assumes that the thymus gland dosage range given in the Pharmacopoeia can be applied to the other glandular substances present in our tablets.

Discussion of the analytical chemistry data

The results from the XRPD and QEMSCAN analytical techniques used by us have identified the excipient in both our tablets as largely a sugar (sucrose), with smaller amounts of several inorganic compounds (such as talc, calcite and apatite). The only information we have, albeit limited and preliminary, on the non-excipient organic compounds present in the 'No. 1 (for men)' tablets is from the MS analytical technique.

The molecules found by this last technique were two (fairly common, especially in fats and oils) fatty acids (stearic and palmitic), an unidentified hydrocarbon and two sugar-containing molecules (assumed to be glycosides). All could be present in either the red cinchona bark or liquorice root of the non-glandular ingredients. Also, whilst no small molecule hormones (e.g. steroids) were found, the analysis was preliminary and further work is needed, especially to search for larger molecules such as peptides/polypeptides and (small) proteins that perhaps are to be found in crushed and dried whole glands or their extracts. However, a degree of molecular decay (especially of these larger molecules) may have occurred since they were first made (i.e. about eighty years ago). Thus, overall our identified organic molecules could also have come from the glandular substances either originally present or their from decay products. It is hoped future (GC/LC-MS) results will shed more light on the composition of our tablets.

Conclusion

Overall, from the recipes on the labels of our two bottles, dating from the late 1930s to the early 1940s, there are present in our tablets (from the non-glandular ingredients): a bitter tonic (cinchona), a sweetener/expectorant (liquorice), an antiseptic (tincture of iodine) and a mild laxative (phenolphthalein). Also present are glandular substances – either whole glands or their extracts – from the prostate, testis, thymus and (probably) ovary glands. There is one hormone present in a very small amount: the female sex hormone estriol.

Whilst the effects of the non-glandular ingredients were known, the effects from the various glandular substances (and the hormone) present were uncertain at this time. A tonic/stimulant effect could however be expected, especially if deficiencies from disease and/or poor diet during the Second World War were present in the people ingesting our tablets. Today, few physicians would prescribe organs or their extracts; however, they are available online or in some Chinese medicine shops. Hormones are prescribed, such as in HRT for menopausal symptoms.

Whilst we cannot currently prove the presence of glandular substances in our tablets from our analytical data, we hope to be able to do so in the future. What we do have are detailed recipes from the reputable community pharmacist who founded the company.

Thus a mild tonic effect could be expected from taking our tablets. Combine this physiological effect with additional expectations from extensive advertising and from the positive information and anonymous testimonials given on the bottle, box and leaflet. So the real could combine with the imagined/expected to give a larger, or even much larger, effect.

But would the effect be aphrodisiacal? This would probably largely depend on user expectations. It was never, as far as we are aware, advertised as such explicitly, but the psychotherapeutic effects from suggestive advertising and from the words (on the labels of the

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bottles) 'Makes Life Anew' should not be underestimated.

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ARTICLE

Ichthyocolla: medicinal 'fish glue'

Christopher J. Duffin

Abstract

Ichthyocolla is a collagen-rich medicinal simple, originally derived from many parts of the parent fish, but more commonly restricted to Acipenseriform swim bladders imported from Russia in early modern times. Used to treat headache, tetanus and leprosy in classical times, the medieval Arabic tradition saw it utilised against haemorrhoids. The colloidal nature of the processed material was exploited in early modern medicine where it was used to treat haemorrhoids, leucorrhoea, diarrhoea, and dysentery. Remarkable for its adhesive properties, it was used topically to bind the separated lips of wounds together, to stabilise broken ribs, and in medicinal plasters.

Introduction

The creation of a systematic inventory of the contents of surviving late seventeenth and early eighteenth century materia medica collections from the United Kingdom has provided an opportunity to examine the history of use of a wide range of medicinal simples.[1] Initial results have been reported mostly for zoological and geological medical materials.[2] The object of the present contribution is to consider the use to which ichthyocolla was put in the history of pharmacy.

Ichthyocolla is the name given to the swim bladder (often referred to as the 'sound' in older literature) of extant teleost fishes. Essentially an internal gas-filled bag-like organ with collagen-rich walls, the swim bladder has been used historically for a variety of non-medical purposes, including as a condom, as a source of protein in foods (particularly as *maw* in Chinese cuisine), to add lustre to silk,[3] and to produce a water-resistant animal glue.[4] Soluble colloidal collagen can be produced by breaking the hydrogen bonds stabilising the triple helix structure of the original collagen molecule, usually by acid hydrolysis. The resulting molecule (the source of isinglass) is amphoteric (possesses both positive and negative charges) and, added as an emulsion to beer and wine, acts as a fining agent by flocculating spent yeast cells and other particles, thereby clarifying the liquid. According to Hill (1751) in Georgian times it was 'the most efficacious, as well the most safe and innocent of all the Ingredients they use for clearing their Wines'.[5] Concerns over potential allergenicity in modern times have led to attempts to find replacements for isinglass.[6]

Although applied in some contexts to a wide variety of bony fishes, both freshwater and marine, in historical medicinal contexts ichthyocolla most commonly refers to the swim bladder of the Beluga Sturgeon, *Huso huso* (Linnaeus 1758) (Family Acipenseridae), sometimes referred to as the Isinglass Sturgeon (Figure 1). The source of beluga caviar (roe from the female), this fish is anadromous, migrating from salt waters into freshwater in order to spawn. Late maturing, it can grow up to 7 metres in length, weigh up to 1,500 kilograms, and live for over 100 years. Now critically endangered due to overfishing and poaching, trade in Beluga Sturgeon is heavily restricted. Its primary occurrences are in the Caspian and Black Sea Basins.

Figure 1. *Huso huso (Linnaeus, 1758) (Family Acipenseridae), the Beluga Sturgeon; complete fish in right lateral view. (Source: From Stephenson (1838) Medical Zoology and Mineralogy, Plate 21, fig. 2)*

In brief, the functions of the swim bladder are (1) to maintain neutral buoyancy; (2) to act as an adjustable float thereby optimising swimming energetics at different depths – by varying the bladder volume, the fish adjusts its overall specific gravity allowing it to sink or ascend the water column; (3) to act as a stabilising agent by maintaining a proper centre of gravity – the bladder is located in the dorsal midline above the gut, so that the centre of mass is below the centre of volume; (4) to provide a reservoir of stored oxygen for aerobic respiration; and (5) to act as a resonating chamber in order to produce or receive sound.

In the Sturgeon, the swim bladder is of the relatively primitive physostomous type. Here, the bladder retains a connection to the alimentary canal by means of the pneumatic duct; replenishment of the gases in the bladder is achieved by the animal swimming to the surface and gulping air from the atmosphere. Excess gas can be voided from the bladder in the same way.

In 1751 Sir John Hill (1714-1775) explained the process by which ichthyocolla was harvested from the parent fish. Having removed the fins close to the body, the 'Bladder, Stomach and Intestines' were removed, carefully washed, diced and then steeped in water for a 24-hour period. Then the mixture was boiled until there was clear evidence of material going into solution, after which it was strained through flannels and cooled. The lighter supernatants were then progressively

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skimmed off the surface and removed, leaving a residue which 'till by Trials they find, that on letting a Spoonfull of it cool it will harden to the Consistence of Glew'. This was then poured onto large wooden table surfaces and allowed to cool further until it could be cut and rolled up.

Hill records Russia as being the greatest exporter of the final product, with the Volga and the Danube being the rivers most heavily fished for the Sturgeon.[7] Caspar Neumann (1683-1737), at various times apothecary in Poland, Berlin, England as well as travelling apothecary to Frederick I of Prussia, records that 'Many waggon loads of this fish are brought to Vienna, in autumn, every Friday afternoon, and sold next morning by the pound'.[8]

the individual leaves to stick together and dry out (Figure 2).[10]

John Jacob Berlu (dates unknown, seventeenth century), a London drug and spice merchant, was well placed to describe in his *Treasury of Drugs Unlock'd* the range of imports he received as ichthyocolla. He states that:

> The best sort is the Patriarch sort, four square, very thin and white, almost transparent, the large Horseshooe sort in thin Rings, and clear, called the Czars sort, is the next; that which is yellow and brown within, a thick sort, is inferiour; that in square Books or Cakes, the worst of all.[11]

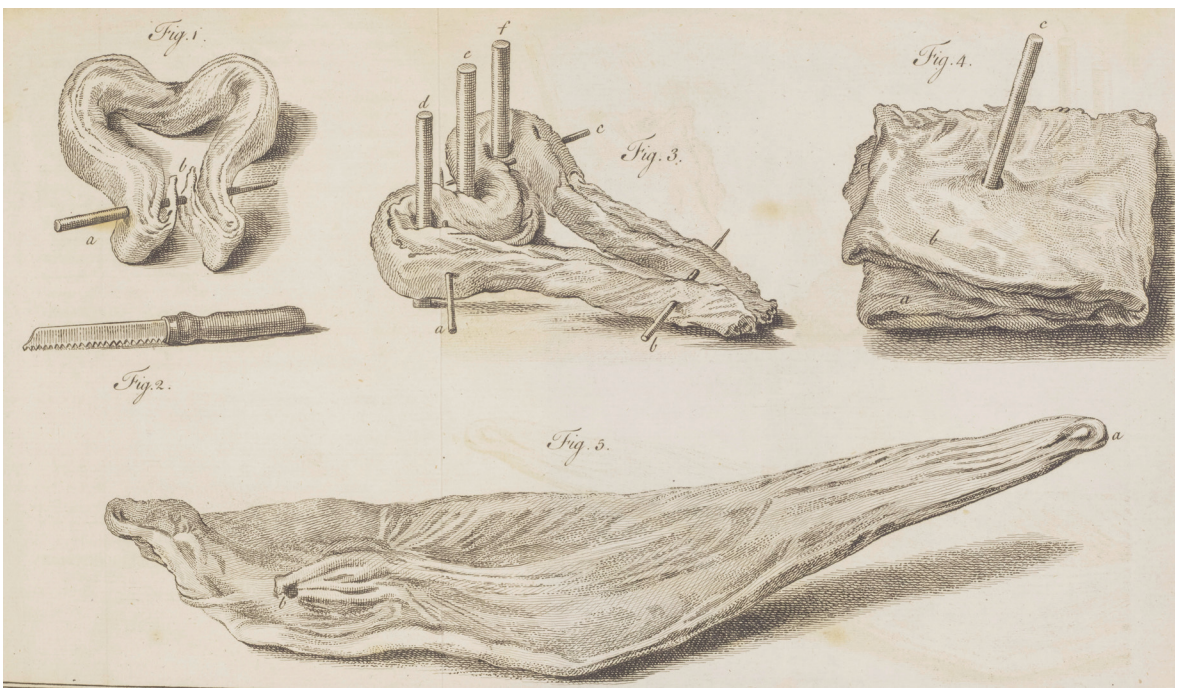

Figure 2. *Prepared ichthyocolla, from Jackson (1773, pl. 1). 1, short staple isinglass; 2, saw knife; 3, Long staple isinglass; 4, Book isinglass; 5, whole swim-bladder. (Source: By kind permission of the Royal Society)*

Slightly later, Humphrey Jackson (1717-1801), who was apprenticed to an apothecary and surgeon in Stockton-on-Tees and then moved to London to work as a chemist,[9] gave a more detailed account of the production of ichthyocolla. He records the extraction of the air-bladder 'while sweet and fresh', the removal of the surrounding membranes, and the organ being air-dried before being rolled up. The whole structure was then folded roughly into a heart shape by judicious use of wooden pegs (Figure 2), and dried more fully in the air. Alternatively, the material could be folded into book-like leaves, called cakes, which were then heated in a metal pan with a small amount of water in order to get

It is clear that numerous substitutes for Sturgeon ichthyocolla, which was esteemed the best available, were easily obtained by the last quarter of the nineteenth century and particularly popular for brewing purposes. These included products from India, China and Brazil.[12]

Pharmaceutical uses

The earliest reference to ichthyocolla of which I am aware is that of the Roman naturalist, philosopher, author and military man, Pliny the Elder (AD 23-79). In his *Naturalis Historia* (Natural History), written around AD 76, he writes (Book XXXII, Cap. 24):

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> 'Ichthyocolla' is the name given to a fish with a glutinous skin; the glue made from which is also known by the same name, and is highly useful for the removal of epinyctis. Some persons, however, assert that it is from the belly of the fish, and not the skin – as in the case of bull glue – that the ichthyocolla is prepared. That of Pontus is highly esteemed: it is white, free from veins or scales, and dissolves with the greatest rapidity. The proper way of using it, is to cut it into small pieces, and then to leave it to soak in water or vinegar a night and a day, after which it should be pounded with sea-shore pebbles, to make it melt the more easily. It is generally asserted that this substance is good for pains in the head and for tetanus.[13]

According to Celsus (as described in the seven-volume medical compendium of the seventh century Byzantine Greek physician, Paulus Aegineta) Pliny commends it for the treatment of epinyctis – an archaism describing night-blains or bean-sized, painful, inflamed pustules that arise in the skin overnight – and also sores (also known as syces) on the eyelids.[14]

Pedanius Dioscorides (circa 40-90 AD), a near-contemporary of Pliny, refers to ichthyocolla in his *De Materia Medica* (Book III, Cap. 88). He repeats the assertion that material from Pontus is of superior quality (as, supposedly, does Galen[15]) and commends it as a component in head salves, facial lotions, and as a medicament in the treatment of leprosy.[16]

There seem to be few references to the use of ichthyocolla in the medieval Arabic tradition. The Persian polymath, Avicenna (Ibn Sīnā; circa 980-1037), is believed to have completed his encyclopaedic medical volume entitled *al-Qānūn fī al-Ṭibb* or *The Canon of Medicine*, constructed in five books, in 1025. Highly acclaimed, it became a standard medical text in both medieval Europe and the Islamic world, and was used in western universities right through to the eighteenth century.[17] Avicenna recommended 'fish glue' both in the treatment of haemorrhoids and, added to soups, in order to prevent the coughing up of blood (haemoptisis).[18]

The increasing importance and availability of sturgeon ichthyocolla in early modern Europe is almost certainly a direct consequence of the opening of trade with Russia during the mid-sixteenth century. Ambitions to find a North East Passage to China led a series of adventurers to Russia, and meetings with the Tsar, Ivan IV Vasilyevich (Ivan the Terrible; 1530-1584).[19] The Muscovy Company, established in 1553 as a direct consequence of these meetings, monopolised trade between England and the Grand Duchy of Moscow for around the next 150 years. Certainly, references to the medicinal use of ichthyocolla, although still relatively sparse in comparison to those for other simples, increase in number through this period. Gideon Harvey (c.1640- c.1700) records that the price per pound in 1678 was 5 shillings and 4 pence.[20] By the late eighteenth century, Charles Alston (1683-1760) was able to report that its use had declined considerably.[21]

Figure 3. *Ichthyocolla from Drawer 23 of William Heberden's Materia Medica cabinet (early eighteenth century), St John's College, Cambridge. (Source: Reproduced by kind permission of the Master and Fellows of St John's College)*

Remains of contemporary apothecarial ichthyocolla survive in a number of early eighteenth century materia medica cabinets. A well-preserved specimen is located in Drawer 23 of the teaching cabinet kept by William Heberden (1710-1801) whilst at St John's College, Cambridge, for example (Figure 3). Further specimens are present in the Vigani Cabinet at Queen's College, Cambridge,[22] the Oglander Cabinet constructed by the apothecary Joseph Clutton in 1729 and held by The Museum for the History of Science in Oxford,[23] and the so-called Corbyn Cabinet held by the Museum of the Royal Pharmaceutical Society in London.[24]

In an echo of Avicenna's advice concerning the treatment of haemorrhoids, John Banister (1540-1610) recommended that ichthyocolla be employed in an emplaster (a sticky paste or salve applied directly onto the skin), together with Terra sigillata, Sanguis draconis, spider silk (Tela aranaea), Mastic, Thuris (resin from the Norway Spruce and other conifers), 'pilo. Leporis' (rabbit hair?), 'Balaustiorum' (Pomegranate), and marine shells.[25] Banister recommended that any dried haemorrhoids be first lanced or opened up by means of

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horse leeches (*Haemopis sanguisuga*), before applying the salve.

Robert Boyle (1627-1691) suggests that ichthyocolla is a 'powerful medicine' in the treatment of 'White Fluors' (and similar 'distempers') – Fluor albus or leucorrhoea, a viscous white vaginal discharge accompanying inflammation of the vaginal mucosa and symptomatic of a range of causes including oestrogen imbalance, vaginal infections and the presence of vaginal trichomonad parasites. Boyle's advice is to:

> Take a Pottle of Ale, and shred into it two Ounces of white Ichthyocolla (Isinglass) and in a loosely stopt Vessel, let the Liquor simper till about half is wasted; strain the rest, and give of it two or three Ounces at a time once or twice a day, as need shall require.[26]

Robert Lovell (c. 1630-1690) reports from Pliny that ichthyocolla 'helpeth night Wheales', and also suggests that, taken in a draught, 'it helps the Lethargy'. He also notes that, as an adhesive, it 'serves to glew instruments withall'.[27]

As is often the case with medicinal simples in early modern texts written in English, William Salmon (1644-1713) provides the most extensive reference to the use of ichthyocolla. In respect of closing wounds by laqueation or 'dry stitching' techniques (where the two lips of the wound are pulled and held together), Salmon notes that ichthyocolla is an effective gluing agent. He indicates that the ichthyocolla should be dissolved in vinegar and then boiled to a glue-like consistency.

As indicated above, this means of processing would result in a colloidal, soluble collagen product. Once painted onto a binding cloth and laid over the wound, the preparation was 'tenacious and strong, and will not be dissolved by the Humidities of the Wound'.[28] For the same purpose, he also commends a paste made of ichthyocolla, wheat flour, egg white, bird lime, tragacanth, and powdered frankincense mixed together with Rose water. Many of these ingredients show similar colloidal and binding properties to that of the ichthyocolla; tragacanth, for example, is a gum obtained from the sap of *Astragalus* spp., a leguminous plant from the Middle East. The gum is harvested as flakes and ribbon-like extrusions from the root of the plant (Figure 4).[29]

One of the main components of the sap is tragacanthin, a mucilaginous colloid which is highly soluble in water. This, together with the closely associated amylose, bassorin, a much less water-soluble but gel-forming carbohydrate, results in an effective binding agent which has a long history of use both topically (in burn treatments, for example) and internally. Salmon recommends the same receipt for the treatment of broken ribs; the emplaster would have been painted onto strong linen, laid over the position of the break and allowed to harden. In addition to protecting the area, the application could be ripped off the surface of the chest 'suddenly with great violence' in the hope of moving the broken ends of the ribs to a position where less pain was experienced, and the danger to the lungs from laceration by the broken ends of the ribs was reduced.[30]

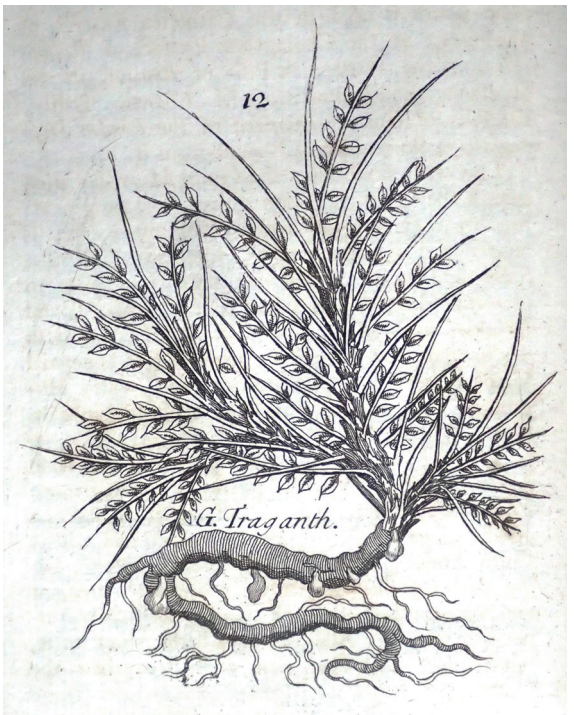

Figure 4. *The plant yielding Gum Tragacanth. Note the flakes of gum being exuded from the root surfaces. (Source: From Pomet, 1737, pl. 58: Note 29)*

The colloidal nature of ichthyocolla was also exploited in other ways. Its ability for the uptake of water to form a hydrogel led to it being appreciated both as a filler and as a drying agent (exsiccative).[31] Applications derived from this included its use as 'ischureticks' – means of thickening the blood. William Salmon suggests two ichthyocolla-containing receipts for this purpose. One involved mixing the fish glue with finely powdered Comfrey root and sugar, while the other used Gum Tragacanth and Syrup of Lettuce, prescribing 'two Doses to be given Morning and Night in Milk'.[32]

As late as the nineteenth century it was still occasionally being used in cases of lung and bowel complaints, and was noted as being 'peculiarly adapted to cases of chronic diarrhoea and dysentery in children'.[33] It was also seen as an emollient for softening the skin, and a demulcent (for reducing irritation and inflammation).[34]

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The isinglass produced from ichthyocolla was also used to produce a high quality gelatin which was often mixed with wine and given to the sick and convalescents as a restorative.[35] In addition, the adhesive properties of the material were exploited in the production of a sticking plaster for covering superficial wounds and known as court plaster. The plasters consisted of silk, sarcenet or taffeta, coated on one side with an adhesive mixture of isinglass and glycerine. The name derives from their use in the eighteenth century by ladies at court for beauty spots. A finishing coat of either Tincture of Balsam of Peru (alcoholic solution of the resin from the Central and South American tree, *Myroxylon balsamum*), or Tincture of Benzoin (a solution of balsamic benzoin resin, obtained from the bark of *Styrax* spp., and dissolved in ethanol) was applied to give the plaster an agreeable odour, with the added benefit of their styptic and antiseptic properties.[36]

According to fashionable trends, the plasters could be black, or flesh-coloured by adding a few drops of *Sanguis draconis*, a red resin obtained from a variety of Mediterranean plants including the palm, *Daemonorops draco.* In an early nineteenth century effort to make these plasters waterproof, they might be impregnated with India Rubber dissolved in naphtha.[37] This was a preferable alternative to the other commonly available plaster at the time – diachylon plaster, most varieties of which relied on litharge of gold (a mixture of litharge or lead (II) oxide, PbO, and red lead, Pb_3O_4) and a variety of plant-based oils and adhesives.

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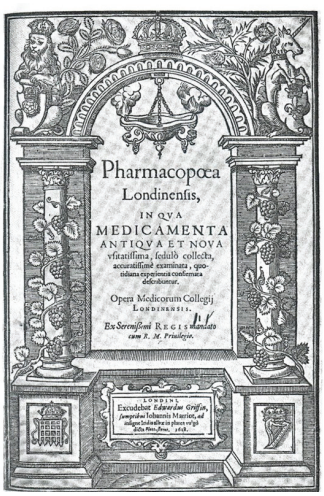
BOOK REVIEW

The Pharmacopoea Londinensis of 7th May 1618 from the London College of Physicians, in facsimile

With an Epilogue on its origins by Henry Oakeley FRCP

London: Royal College of Physicians, 2018. Pp. 184 + xvi. Hardback, price £xx.00. ISBN 978-1-86016-749-2. Available from https://shop.rcplondon.ac.uk.



Reviewed by Briony Hudson

The Pharmacopoea [sic] *Londinensis* was first published by the (then) London College of Physicians on 7 May 1618. To mark its 400th anniversary, the Royal College of Physicians (RCP) has published a facsimile of an original first edition held in its library, with the inclusion of an epilogue by Dr Henry Oakeley setting it in context.

As a facsimile, it is extremely satisfying. The decision was taken to reproduce the cover as well as the contents so that – unwrapping it from its parcel – I was initially duped by its apparent age. The facsimile duplicates the original book warts and all, so that the much later RCP library bookplate with its pencil shelf-marks, the scratchy handwritten note opposite the title page stating that it is the first edition, and the stains and inconsiderately-placed stamp on the illustrated title page itself, are all faithfully reproduced. Of course, the contents are all in their original Latin apart from the English royal proclamation, which was included by the compilers in 1618 to provide justification for the publication. Handwritten annotations throughout give a sense of the book in use, with underlining, translated words and additions made by past readers, not to mention stained pages.

The epilogue by Henry Oakeley begins by setting the scene, describing the position of the College and the events that led up to the book's publication, although some of his statements perhaps need to be treated with a little caution. He indicates, for example, that the pharmacopoeia was the result of 'physicians and apothecaries working closely together'. Yet in her history of the Society of Apothecaries Penny Hunting tells us that the 'six apothecaries were consulted about the publication at the eleventh hour', only being called upon in February 1618, the pharmacopoeia having been on the point of completion the previous September. And despite the assiduous daily attendance of six of them, one of their number – John Parkinson – claimed that the physicians 'did not take the advice proffered by the Apothecaries.'

Oakeley helpfully provides a comprehensive overview of earlier pharmacopoeias, noting that they provided the inspiration for the production of the London book in 1618. But he also gives the current reader a walk through its antecedents, starting with Sumerian records in the 4th millennium BC, continuing with published textbooks from Theophrastus in the third century BC, and ending with the immediate precursors of the 1618 publication. This section comments briefly on the publications, their authors and their approaches, and also includes details of whether there are references within the *Pharmacopoea Londinensis* to these earlier works. As a brief guide to the broad history of pharmacopoeias, it works well and provides very useful context for the 1618 publication. The references giving full details of the precursor publications are also very helpful for researchers in this area.

The epilogue concludes with a detailed analysis of the *Pharmacopoeia Londinensis*: its format and its inspiration; its contents including an interesting short discussion of the paucity of global origins of many of the ingredients; and the next stage in the story, the withdrawal of this first edition to be replaced by a new, corrected and enlarged version in December 1618. Only twelve copies of the May 1618 edition are known to exist, and so this high-quality facsimile of one of the survivors seems a very fitting way to mark its 400th anniversary.

The book will be of interest to pharmacy and medical historians, those interested in medicines and ingredients, those interested in the transmission of learned knowledge and its control, and those interested in the relationship between physicians and apothecaries, alongside rare books enthusiasts. Not least, it makes a handsome addition to a researcher's bookshelves.

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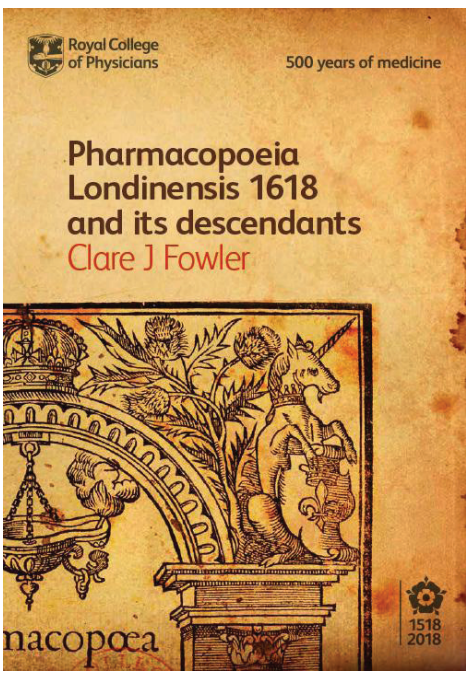
BOOK REVIEW

Pharmacopoeia Londinensis 1618 and its descendants

By Claire J Fowler

London: Royal College of Physicians, 2018. Pp. 140 + viii. Softback, price £15.00. ISBN 978-1-86016-714-0.



Reviewed by Stuart Anderson

The first edition of the *London Pharmacopoeia* appeared in 1618, so it is no surprise that following its 400th anniversary several publications marking the event have appeared. The first edition has been subject to considerable scrutiny over the years by pharmaceutical historians, most notably George Urdang, who in 1944 published an 80-page analysis alongside a reproduction of the pharmacopoeia itself. We might wonder therefore whether there is still anything new to say about it.

In this book Claire Fowler, emeritus professor of uroneurology at the Institute of Neurology in London, describes the origins of the *Pharmacopoeia Londinensis* within the College of Physicians, the individuals involved in its production, and some of its legacies. The book is divided into six chapters. Chapter 1 describes the origins of the College of Physicians and provides brief biographies of the fellows who were involved in writing the pharmacopoeia. Chapter 2 examines the origins and work of apothecaries, their role in the Grocers Company, and the place of the physicians.

Chapter 3 explains why the *Pharmacopoeia Londinensis* 1618 was written, the physicians seeing it as a means of curbing the competition that apothecaries presented to their medical practice.

Fowler suggests that a mention in the College minutes in 1614 to the preparation of the pharmacopoeia was a reaction to the expected establishment of an independent Society of Apothecaries. Chapter 4 explores the reasons why two version of the *Pharmacopoeia Londinensis* were published, one in May 1618 and a second in December 1618.

Chapter 5 is devoted to the life, work and publications of Nicholas Culpeper, and to his translations of the *Pharmacopoeia Londinensis*. Finally, Chapter 6 describes the past and present gardens of the Royal College of Physicians of London, including a garden map and a detailed description of the *Pharmacopoeia Londinensis* beds, including a complete list of their contents.

Fowler has clearly immersed herself deeply in Jacobean history (the period covering the reign of King James VI of Scotland, 1567-1625, who was also King James I of England from 1603) and her scholarship is impressive. Of particular note are her novel hypotheses, based on meticulous and original research. Firstly, she offers persuasive new evidence about a possible explanation for the great differences between the May and December 1618 versions of the first edition of the *Pharmacopoeia Londinensis*. She suggests that it was Dr Theodore de Mayerne who gave his copy of the text to the printer, resulting in the first version. She discovered in Mayerne's papers a handwritten page headed *Pharmacopoea* [without an i, as in the printed version] *Londinensis sectiones* listing the sections exactly as they appear in the May version.

Secondly, whilst conceding a lack of documentary evidence to support it, she suggests that King James was greatly encouraged by the success of his mediations between feuding ecclesiastical factions which resulted in the new translation of the Bible, and that working together on the *Pharmacopoeia Londinensis* might smooth the troubled relationship between the physicians and apothecaries. Although cooperation between the two groups is highlighted in the royal proclamation, this hypothesis is less convincing, given evidence elsewhere that the advice of the apothecaries was only sought at the last minute, and that even the advice offered was ignored by the physicians.

There are other areas where assertions made need to be treated with care. An important consequence of the publication of the *Pharmacopoeia Londinensis* is claimed to be 'its eventual evolution into the *British Pharmacopoeia*'. This is a little misleading. Following publication of the first edition of the *Edinburgh Pharmacopoeia* in

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1699 and the *Dublin Pharmacopoeia* in 1807, the RCP issued a new edition of the *Pharmacopoeia Londinensis* in 1809 which incorporated items from both the Edinburgh and Dublin ones. The RCP held discussions in the 1830s with the Edinburgh and Dublin Colleges with a view to creating a national pharmacopoeia, but the attempt failed, and a final edition (the tenth) of the *Pharmacopoeia Londinensis* was published in 1851.

Progress towards a national pharmacopoeia was only made following passage of the Medical Act in 1858, which established a General Medical Council for the United Kingdom (which included Ireland) and tasked it with publishing a book to be called the *British Pharmacopoeia*. When the first edition of the *British Pharmacopoeia* was published in 1864 the RCP was dismissive; the president, Sir Thomas Watson, denounced the book as being a 'dangerous one' and that it should not be used. This was hardly a smooth evolution from *Pharmacopoeia Londinensis* to *British Pharmacopoeia*.

There are other places where pharmaceutical historians might have misgivings about some of the statements made. No formal definition of a pharmacopoeia is given, and publications are variously described as antidotoria, dispensatories, etc. This is not helped by the occasional use of 'dispensary' where 'dispensatory' is meant.

Likewise, historians of pharmaceutical regulation may be surprised to learn that 'the evolution of the law and regulation of medicines…can be traced back to the *Pharmacopoeia Londinensis* and the related publications from the sister colleges in Dublin, Edinburgh and Glasgow'. In fact, the history of drug regulation dates from a much earlier period, and in Britain encompasses the role of 'garblers' in the 1390s and the first 'poison law' in Scotland in 1480. And the Royal College of Physicians and Surgeons of Glasgow never produced a pharmacopoeia.

The issue of where the pharmacopoeia would be used also requires clarification. Fowler suggests that it was James I who decided that it should be used 'within this Realme of England and dominions thereof' rather than just London. In fact, it was through an Act of Parliament in 1523 that the remit of the London College was extended to the whole of England, and the same would have applied to the pharmacopoeia on its publication in 1618.

The reference in the royal proclamation that it was made 'in the sixteenth yeere of Our Reigne of England, France, and Ireland, and Scotland the one and fiftieth' is not the same as 'within this Realme of England and dominions thereof.' This was royal embellishment; James I styled himself 'King of Great Britain and Ireland' as well as 'King of France,' despite the fact that he had no authority whatever in France. Scotland and England were separate sovereign states, with their own parliaments and laws. The remit of the *Pharmacopoeia Londinensis* never extended beyond England and Wales.

Likewise, the part played by the *Pharmacopoeia Londinensis* in the relationship between the different groups is a little confused in places. The back cover tells us that it 'was used in the struggles that marked the separation of two professions – the physicians and the apothecaries'. Yet they were already fully separated well before the apothecaries broke away from the Grocers Company in 1617 to form the Society of Apothecaries. Rather, as the author points out, the College took the view that it was separation of the apothecaries from the grocers that provided an opportunity to make the former subservient to the physicians, and that the pharmacopoeia provided a means of doing so.

Yet despite these niggles the book has much to commend it. It is on the whole an informative and entertaining read. Well over a third of the contents is devoted to Culpeper and the RCP gardens. The book is clearly referenced, although an index would have been helpful. But those looking for brief and easily readable introductions to these subjects will find much to interest them here.

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BOOK REVIEW

Coca Wine: Angelo Mariani's Miraculous Elixir and the Birth of Modern Advertising

By Aymon De Lestrange

Rochester, Vermont, US: Park Street Press, 2018. Pp. x+246. Paperback, price $40.00. ISBN 978-1-620-55784-6. Ebook, ISBN 978-1-62055-783-3.

Reviewed by Peter Homan

This decorative and informative paperback tells the story of Angelo Mariani, a French pharmacist and entrepreneur, who produced a tonic wine that he labelled *Vin Mariani*. It contained coca and Bordeaux wine, and became famous throughout the world. The book contains eight chapters, plus acknowledgements, added information and a comprehensive index.

Chapter 1 presents a brief history of coca, an evergreen shrub that grows on the slopes of the Andes. The leaves have been chewed from at least 6050 BCE. It played an important role in medicine, religion, leisure time and work. The author quotes Conquistador Pedro Cieza de Leon, who in 1553 wrote that 'coca is one thing that the Indians are never without in their mouths; from morning until they lie down to sleep, they never take it out'.

Chapter 2 tells of the early life of Angelo Mariani – born Ange-Francois Mariani – on 29 December 1875, and the formulation of his coca wine. Chapter 3 describes his factory and the different products that he produced there based on coca, whilst chapter 4 explores 'The Medicinal Virtues of *Vin Mariana*' which included relief from pain, added nutrition, general tonic effects, and a cure for a morphine habit.

Vin Mariani became very popular in many countries, particularly France and the United States, and was claimed to be the most prescribed medicine. The story is told how the American President Ulysses S. Grant suffered from terminal throat cancer, but wanted to write his memoirs for the family. He was prescribed *Vin Mariani*, which relieved his pain and nourished him when he could no longer eat. He finished his memoirs a few days before he died.

Chapter 5 turns to advertising. Mariani was able to persuade famous artists like Mucha and Vallet to design posters for him. So many famous people gave testimonials to his wine that he published 905 of them in albums. Chapter 6 features Mariani's hospitality, which included lavish banquets laid on for many of these famous people who became his close friends.

It is not surprising that such a successful product had its imitators. Chapter 7 lists other coca wines that were marketed in many countries, and the people who developed them. These included Charles Pemberton of the United States who made *Pemberton's French Wine Coca*, which had added kola nut and damiana. But in America in 1885 a law was passed prohibiting the sale of alcohol. Pemberton removed the wine and damiana, added sugar syrup, citric acid and soda, and renamed his product Coca-Cola. England had its own coca wines, including *Hall's Coca Wine*, *Armbrecht's Coca Wine*, and *Buckfast Tonic Wine* – a de-cocainized version of which is still on sale today.

By the end of the nineteenth century there had been a great increase in cocaine addiction, and in America, laws were introduced to control sales. Chapter 8 deals with the change in regulation of cocaine from prescription to prohibition. Many preparations relied on added cocaine. Mariani maintained that his product contained no added cocaine, but only the infused leaves. He later used de-cocainized leaves. Mariani died in 1914. His son continued the business, and *Vin Mariani* was on sale until 1961.

At the end of the book is a chronology of coca, copious endnotes on the chapters, a bibliography of published works by and about Angelo Mariani, and a comprehensive index.

This is a very informative and easy to read book. It provides a history of coca, cocaine, product advertising and the man who produced what was to become, in its time, the world's most famous medicine. The lavish illustrations are of a very high quality, and there is hardly a page that does not possess one. This is a book for all those with an interest in the history of pharmacy.

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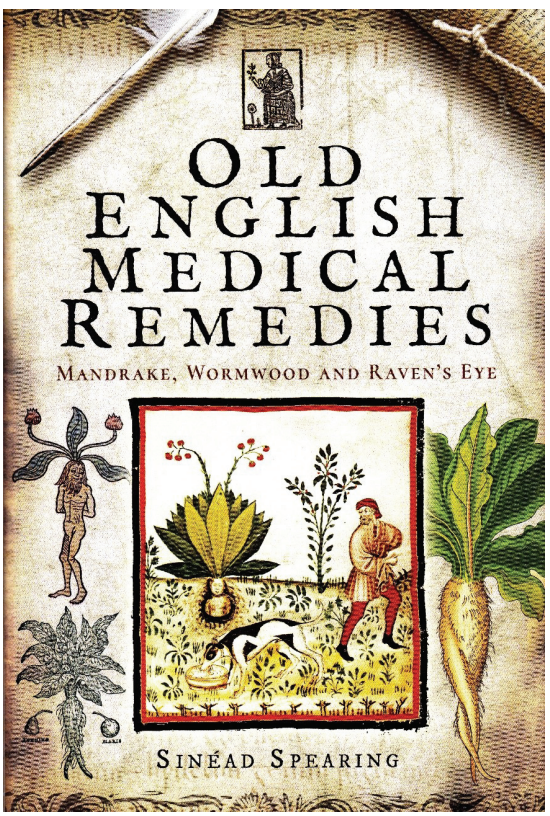
BOOK REVIEW

Old English Medical Remedies: Mandrake, Wormwood and Raven's Eye

By Sinéad Spearing

Barnsley, UK: Pen & Sword, 2018. Pp xviii+172. Hardback, price £19.99. ISBN 1526711702.



Reviewed by Christopher J. Duffin

To read this book is to enter the arcane world of Anglo-Saxon medicine, where a drink of ale containing egg and sheep's dung was the cure for a spider's bite, and jumping three times over the grave of a dead man was part of the treatment for failure to conceive.

Anglo-Saxon medical texts are rather few and far between. The most famous – and the one forming the focus of this book – is a manuscript in the British Library (Royal 12, D xvii), generally referred to as the Leechbook of Bald, the earliest translation of which was produced by the Rev. Oswald Cockayne in 1864. Sinéad Spearing, formerly a professional musician and now a psychological historian with a special interest in Old English medicine, concentrates on the third section of Bald's Leechbook.

After providing a very useful overview of its place in the rather limited range of available Old English medical texts, she considers potential candidates for authorship of the volume, the unique elements of its structure, problems associated with its translation, and the contemporary intellectual environment of its composition. Taking the reader to the heart of the text – and sometimes arguing the finer points of etymology – the author speculates persuasively about the impact of prevailing contemporary beliefs on prescribing practice.

In so doing, she takes the reader into the unfamiliar territory of a world view that saw the activities of a range of supernatural beings – elves, dwarves, hags and nightwalkers – as being amongst the causes of certain diseases. Psychological theory, etymology, archaeology, classical and later historical texts, a broader view of herbal treatments, Christian syncretism, and a delightfully expansive and erudite understanding of the philosophical underpinnings of a wide range of folk beliefs (some with echoes surviving to the present day), are all cleverly focused on elucidating the context and significance of the recipes under consideration, and lead the reader down some interesting philosophical alleyways.

The eleven chapters of the book introduce the reader to a fascinating but somewhat alien world, where the supernatural is commonplace, and the timing of the harvest of appropriate therapeutic herbs, sympathetic magic, ritual proclamations, transference, numerology, amulets, charms and talismans, were all used in the treatment of the sick. Such therapies as the eyes of living ravens, mandrake root, the Nine Herbs Charm, stepping over dead men's graves, and a wide range of herbal simples are discussed, as is the prominence of women folk-healers.

Intelligently and clearly written, with the support of relevant quotes from a range of Anglo-Saxon texts, classical and historical sources as well as modern academic writers, this book brings some interesting new perspectives to a consideration of Anglo-Saxon medical texts. A useful – but not comprehensive – bibliography accompanies the text, which is also supported by eight pages of black and white illustrations; although relevant to the book's content, these are not tied directly to the text.

This book is certainly an interesting read, providing a stimulating new perspective to a rather neglected area of historical medical literature.

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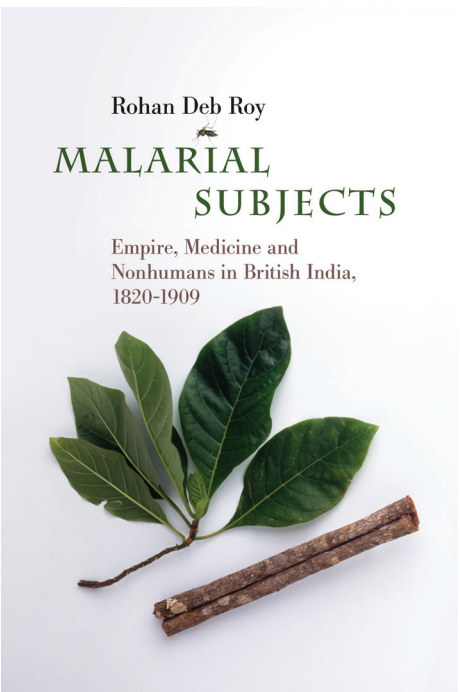
BOOK REVIEW

Malarial Subjects: Empire, Medicine and Nonhumans in British India, 1820-1909

By Rohan Deb Roy

Cambridge, UK: Cambridge University Press, 2017. Pp. xvi + 332. Hardback, price £78.99. ISBN 9781107172364. An online version of this work is published at http://dx.doi.org/10.1017/9781316771617 under a Creative Commons Open Access licence.



Reviewed by Mark Nesbitt

The history of quinine, and the bark of the cinchona tree from which it is derived, is one of the big subjects of the history of pharmacy. The outline of the story is well-known: the discovery 400 years ago that cinchona bark was one of the few effective treatments for malaria; its export on a massive scale from the Andes to Europe; the isolation of quinine alkaloids in 1820 by Pelletier and Caventou, and the appropriation of the tree and its transfer to Asian plantations by the British and Dutch empires in the mid-nineteenth century. Yet quinine's history is often shrouded in legend, and the details of the processes and motivations involved in its acquisition and use remain unclear.

Processes and motivations are at the heart of Rohan Deb Roy's bold book, which takes as a central theme the contested production of knowledge about malaria, mosquitoes and quinine in British India in the long nineteenth century. Drawing mainly on papers in the National Archives of India, this is an account that gives a welcome emphasis to the story in India, and to the actions of native villagers and physicians, alongside those of European settlers and quinologists. Throughout, the book challenges simplistic tellings of the quinine story or the workings of empire.

Moving through a series of episodes – the framing of malaria as a colonial disease, the malaria outbreaks of the Burdwan region of Bengal, the development of cinchona plantations, and the transformation of understanding of malaria in the 1890s – quinine is always at the centre. Deb Roy begins with a delicate and nuanced account of the introduction of cinchona trees to India, highlighting the initial perceptions of the cinchona tree as a fragile and exotic plant, the many disagreements over its means of cultivation, and its transition to what proved to be a mundane and easily cultivated plant. A major topic is then the disputed purity of the quinine alkaloids extracted from trees in the Indian Plantations, in contrast to those extracted in London. Here Deb Roy draws attention to the practical difficulties of alkaloid extraction in India, which was often more expensive than quinine on world markets, and to the conflicts of interest of pharmaceutical wholesalers such as Howards in London. These had a major role in guiding Indian production, and yet were both major consumers of Indian bark and exporters of quinine to India. Moving beyond production and manufacture, the book also investigates the delivery of quinine to Indian consumers, whether through native pharmacists or via post offices.

I find it hard to summarise this book in a short review: it is extraordinarily rich in provocative ideas and fresh views, many gained through close reading of nineteenth century printed texts and archives. Densely argued yet readable, the book has a notably rich bibliography and many well-chosen images. Many aspects of its methodology, such as its emphasis on the agency of Bengal villagers and physicians, or indeed of non-humans such as malaria and cinchona, will be influential in any future study of the subject. The book touches on many more aspects of malaria and quinine than those discussed above, and is thus essential reading for all interested in malaria and quinine, at any period in the history of this disease and its entangled treatment.

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